Evaluating the Impact of Domestic, Regional and International Violence and Instability on the Jordanian Economy Using the Event Study Methodology

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Abstract

This paper deploys the event study methodology to examine the impact of domestic, regional, and international violence and instability events on the Jordanian economy. The study demonstrates the ASE's ability to incorporate news of such negative events into the valuation of its listed companies. ASE investors react positively to such events when occurring in Lebanon and Iraq, but negatively when they occur internationally. However, generally investors do not respond to such events when they occur domestically. International events trigger a statistically significant negative reaction from the banking sector. The study evaluates the impact of these events across different sectors and concludes with relevant policy recommendations.

1   Introduction

Jordan is a small country that geographically lies at the heart of a regional sea of violence and instability. Jordan is wedged between the Iraqi quagmire on the east, the Israeli-Palestinian tragedy on the west, and the perpetual Lebanese civil feud on the north-west. These conflicts continue to haunt the region and its prospects for achieving its development potential. During the past few years, policy makers in Jordan have embarked on a series of economic reforms to improve Jordan's business environment to enable it to attract more investment and grow its economy. Yet the question that continuously haunts these policy makers is how to best address the exogenous factor of violence and political instability which they believe has turned potential investors away and hampered Jordan's potential growth. For example, Rima Khalaf Hunaidi, Jordan's former Deputy Prime Minister and Minister of Planning believes that Jordan's "economy was hurt [from the Persian Gulf War] as Iraq was a key trading partner. During this period, large numbers of Jordanians repatriated to the country, severely stressing sectors such as education, employment and water services."[1] Furthermore, key donors who strongly influence Jordan's economic policy share the same belief. USAID states that "the U.S. led war in Iraq in 2003 negatively impacted Jordan's economy, given Jordan's extensive trade relations with Iraq and dependence on Iraq for discounted oil".[2]

This conventional view on the negative impact of regional violence and instability has not been researched and measured. Additionally, Jordan should learn about the impact of such negative events when they occur domestically and internationally. The hotel bombings in Amman in November 2005 highlight this need. Such research is paramount to designing targeted polices that address such hurdles if research documents them. Appreciating the magnitude of the impact and the sectors that are most vulnerable to conflict will guide Jordan's economic policy towards neutralizing the impact of such threats. A finding that documents Jordan's resilience in the face of instability, however, would boost its attractiveness as a robust investment destination. It would further empower its economic reforms and their domestic acceptance. Reforms will no longer be seen as nominal policy maneuvers that are void of credible impact on a small country at the heart of a regional sea of violence and instability.

This paper focuses its study of regional events on those impacting Lebanon and Iraq. The Palestinian-Israeli conflict is not within the scope of this paper. The on-going conflict in Palestine does not represent an appropriate case study due to its long-term origins which have been incorporated into investors' valuations and expectation. Single events within the long scope of this event and its immense scale are not expected to have a direct measurable impact on the securities market. Thus, from this stage on and throughout this paper the term "regional events" will refer to those occurring exclusively in Lebanon and Iraq.

This paper analytically investigates whether domestic, regional, and international violence and instability affect the Jordanian economy, and if so measure the magnitude of this impact. It assesses whether the impact of regional events is different from

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[1] The World Bank's Practitioners of Development Seminar Series, URL:
"http://info.worldbank.org/etools/bspan/PresentationView.asp?PID=1291&EID=328"
[2] The USAID mission to Jordan website, URL:" http://jordan.usaid.gov/jordan.cfm"

comparable domestic and international events. The study further contrasts the impact of such events on the different sectors of the Jordanian economy.

The study deploys the event-study methodology to evaluate the impact of regional instability on the Jordanian economy as proxied through the impact of such events on the prices of securities listed in the Amman Stock Exchange (ASE). If the ASE is efficient, then the impact of various events on the investors' beliefs about the future vitality of the listed firms and the domestic economy will be transmitted rapidly through their stock prices. Through examining the variation of the prices of listed securities from their previous trend, we can estimate how investors perceive the impact of such negative shocks.

While few event-studies have been recently conducted on violence, instability and terrorism, hardly any focused on the impact of such negative events on the Arab Middle East region. As Brück and Wickström (2004) point out, "the analysis of the effects of terrorism on developing countries, and especially on developing Muslim countries … appear to be under-researched in economics."[3] In fact, this is the first study that attempts to do that for Jordan. Furthermore, to the best of my knowledge this is the first study to document positive impact of regional violence and instability on a country. Additionally, unlike other event studies of violence, this study uses individual stock data of listed firms rather than the aggregate weighted market index. This achieves greater efficiency in accounting for the overall impact on the whole economy. Basing the analysis on the market index would skew the results towards a limited sample of firms with the highest market capitalization.

The rest of this paper is organized as follows. Section 2 reviews the existing literature that uses event studies to evaluate the impact of violence and instability on an economy. The section also states the hypotheses that are tested in this study. Section 3 offers an overview of the ASE and the data that is utilized in this study. Section 4 presents the deployed event-study methodology. Section 5 displays the results of this analysis. Section 6 provides an interpretation of the results, and section 7 concludes with policy recommendations.

2   Literature Review and Hypothesis

2.1   Literature Review

The use of event-studies to measure the impact of various events has been long established. As MacKinlay (1997) points out "perhaps the first published study is James Dolley (1933)".[4] Key improvements to the utilized methodology have been deployed over the decades, perhaps most notably by Eugene Fama et al. (1969). Event-studies are commonly used to evaluate the impact of firm level events on their stock prices such as quarterly earnings announcements. Event-studies have been used recently to evaluate the impact of terrorism and conflict. Generally, these studies found that such turbulent events lead to a negative impact on the securities markets' evaluation of its listed firms.

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[3] Brück Tilman and Wickström Bengt-Arne, "The Economic Consequences of Terror: A Brief Survey", HiCN Working Paper 03, April 2004.

[4] MacKinlay Craig, "Event Studies in Economics and Finance", Journal of Economic Literature, Vol. 35, No. 1 (Mar., 1997), pp. 13-39.

Abadie and Gardeazabal (2003) measure the impact of terrorism on the economy of the Basque region. They use the ceasefire truce of September 1998 as a natural experiment to evaluate the impact of violence. Their event-study finds that stocks of firms with significant presence in the Basque region displayed significant positive performance as the truce becomes credible. The stocks, however, suffer negative performance as the truce comes to an end. Additionally, Abadie and Gardeazabal construct a counter-factual Basque region from regions that economically resembled the Basque prior to the break out of conflict in the 1970's. They find that the GDP per capita for the Basque region dropped 10 percent as compared to its counter-factual control region. The gap was shown to widen following spikes in terrorist events.[5]

Chen and Seims (2004) deploy the event study to evaluate the impact of fourteen negative events such as Pearl Harbor and Iraq's invasion of Kuwait in 1990 on stock market indices. They report negative market reaction ranging from -6.45% for Pearl Harbor, to -7.90% for the September 11th attacks over an 11 day window. They show that the U.S. stock exchange markets are more resilient than in the past and that they require less time to recover from the negative shocks than other global capital markets. They argue that the increased market resilience is partially explained by a stable financial sector that offers sufficient liquidity and minimizes panic.[6]

Berrebi and Klor (2005) evaluate the impact of such attacks on Israeli companies during the period 1998-2000. In order to isolate common industry shocks form negative events, they pair US and Israeli companies with similar characteristics. They find that the second Palestinian Intifada had a negative impact of 5% on non-defense firms, while defense and security companies had a significant positive reaction to this event of 7%.[7]

Karolyi and Martell (2005) examine the impact of 75 terrorist attacks against firms on their evaluation. They find a statistically significant negative impact of 0.83%. Their results differ depending on whether the attack took the form of loss of physical capital or human capital. They find that attacks against human capital, like kidnappings of firm executives, lead to higher losses in stock prices than those resulting from attacks against physical targets such as facilities or buildings. They also find that attacks in wealthier and more democratic countries result in larger drops in share price reactions.[8]

Eldor and Melnick (2004) investigated the impact of violent events in Israel on the Israeli stock market. They find that the impact of suicide attacks on the stock and foreign exchange markets are permanent. The numbers of fatalities and injuries left a permanent impact also. On the other hand, the location of a terror attack had no effect on either market. Additionally, they find that markets did not become desensitized to terror attacks. They conclude that financial markets continued to efficiently perform their economic functions and that market-liberalization policies contributed to coping with terror.[9]

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[5] Abadie A., Gardeazabal J., "The Economic Costs of Conflict: A Case-Control Study for the Basque Country", American Economic Review 94, 2003, pp. 113-132.

[6] Chen, A.H., Siems, T.F., "The effects of terrorism on global capital markets", European Journal of Political Economy, 2004, pp. 20.

[7] Berrebi, C., and E. Klor, "The Impact of Terrorism Across Industries: An Empirical Study," Hebrew University of Jerusalem working paper, 2005.

[8] Karolyi, G.A. and R. Martell, "Terrorism and the Stock Market," Ohio State University working paper, available at SSRN: (http://ssrn.com/abstract=823465), 2006.

[9] Eldor R., R. Melnick, "Financial markets and terrorism. European Journal of Political Economy", 2004.

Thus, the existing literature has documented by far solely the negative impact of violence and instability. The single outlier is the study of Berrebi and Klor (2005) which found a positive impact of such events on Israeli defense companies. Nonetheless, the existing research has not explored the intricate and complex cross-boundary effects of such turbulent events. This study explores the ways in which one person's disaster could be a blessing or a curse for another.

2.2 Theoretic Framework

Jordan's Gross Domestic Product (GDP) can be measured as:
$$GDP = C+I+G+(Ex-Im)$$
where C is consumption, I is investment, G is government spending, Ex are exports, and Im are imports. Jordan's investment can be broken into investments originating domestically ($I_{Domestic}$), regionally ($I_{Regional,Jordan}$), and from the rest of the world ($I_{ROW,Jordan}$). Jordan's investment can be represented as follows:

$$I_{Jordan} = I_{Domestic} + I_{Regional,Jordan}[Oil_{World\_Demand}, I_{Regional,Region-Jordan}(\text{Re}g\_InStab)]$$
$$+ \eta(I_{ROW,Jordan})$$

Jordanian investment originating from within the region is a positive function of the world demand for oil (Oil_{World_Demand}). An increase in the world demand for oil increases the price of oil, leading to a rise in savings in the region's oil rich Gulf countries. The increased savings in turn lower the interest rate in the Gulf, thus leading to a higher investment rate. A portion of these investments will be invested in regional countries, including Jordan. Thus, a negative event that hits international markets and afflict their economies will result in a decreased oil demand. This eventually leads to decreasing investment in Jordan originating from the oil rich Gulf countries. That is, within this framework, the international economy complements the Jordanian economy.

Furthermore, in the aforementioned equation, Jordanian investments originating from within the region are a negative function of regional investments in surrounding countries excluding Jordan ($I_{Regional,Region-Jordan}$). Through mental accounting or portfolio diversification, a certain share of investments originating from within the region will be dedicated to investment in the region. Thus, the more regional investment that is destined to regional countries other than Jordan, the less that remains to be invested in Jordan. Also, $I_{Regional,Region-Jordan}$ is itself a positive function of regional stability ($\text{Re}g\_Stab$) since more regional stability will lead to more investments in other countries in the region. Therefore, a negative regional shock will divert investments from these regional countries to Jordan. Hence, within this framework the Jordanian economy and the other economies within the region are substitutes.

$$\frac{\partial I_{Jordan}}{\partial(Oil_{World\_Demand})} > 0 \qquad \frac{\partial I_{Jordan}}{\partial I_{Regional,Region-Jordan}} < 0 \qquad \frac{\partial I_{Jordan}}{\partial \text{Re}g\_Stab} < 0$$

Similarly, Jordan's exports can be broken down to tourism (Trsm), Remittances (Rmt), and all other exports (AOE).

$$Ex_{Jordan} = Trsm_{\mathrm{Re}\,gional,Jordan}(Oil_{World\_Demand}, Trsm_{\mathrm{Re}\,gional,\mathrm{Re}\,gion-Jordan}(\mathrm{Re}\,g\_Stab))$$
$$+ Rmt_{Jordan}(Oil_{World\_Demand}) + AOEx_{Jordan}$$

Tourism originating from within the region ($Trsm_{\mathrm{Re}\,gional,Jordan}$) is a positive function of world demand for oil. An increase in oil income to the oil rich Gulf countries will increase the consumption on tourism to regional destinations, including Jordan. Remittances are also a positive function of world demand for oil, because an economic boom in the Gulf countries will increase demand for Jordanian professionals to work there, thus increasing remittances to Jordan. Hence, similar to the case of investment, Jordanian exports are complementary to the well being of the world economy. Thus, a negative shock to the world economy will hurt Jordanian exports.

On the other hand, regional tourism to Jordan is a negative function of tourism from the rich Gulf countries to countries in the region other than Jordan ($Trsm_{\mathrm{Re}\,gional,\mathrm{Re}\,gion-Jordan}$). Additionally, ($Trsm_{\mathrm{Re}\,gional,\mathrm{Re}\,gion-Jordan}$) is itself a positive function of regional stability ($\mathrm{Re}\,g\_Stab$). An increase in regional stability will increase regional competition for tourism from within the region and thus would decrease tourism spending in Jordan. Thus, regional tourism in Jordan is a negative function of regional stability. Hence, as in the case of investments, the Jordanian exports are substitutes to regional ones. A negative regional shock in these competing countries will benefit Jordanian exports.

$$\frac{\partial Ex_{Jordan}}{\partial(Oil_{World\_Demand})} > 0 \qquad \frac{\partial Ex_{Jordan}}{\partial Trsm_{\mathrm{Re}\,gional,\mathrm{Re}\,gion-Jordan}} < 0 \qquad \frac{\partial Ex_{Jordan}}{\partial \mathrm{Re}\,g\_Stab} < 0$$

Thus, the investment and export channels that feed in Jordan's GDP work unambiguously in the same direction vis-à-vis its relationship with international and regional economies. Overall the economic relationship between Jordan and the rest of the world through the investment and exports channels is a complementary one. The relationship between Jordan and regional countries is a substitution one. This framework drives the hypothesis of this study.

2.3 Hypotheses:

This paper specifically investigates four hypotheses:

Hypothesis 1: The ASE will react to news of negative domestic, regional and international events.

As an efficient market, the ASE will update its evaluation of listed companies upon reception of new information. Thus, negative shocks, whether they occur domestically, regionally, or internationally, will affect the ASE.

Hypothesis 2: The ASE will react negatively to domestic adverse events.

Negative domestic events will hinder the expectations for future political and economic stability of Jordan. This will jeopardize the appraisal of the future profitability of the listed companies. Thus, the ASE is expected to react negatively to domestic turbulent events.

Hypothesis 3: The ASE will react negatively to international adverse events.

As highlighted by the theoretic framework above, the relation governing the Jordanian and international economies is one of complementarily. Thus, the ASE is expected to react negatively to international adverse events.

Hypothesis 4: The ASE will react positively to regional adverse events.

In light of the substitution relationship between Jordan and the regional economies as presented in the aforementioned theoretic framework, regional adverse events are expected to prompt positive ASE response.

In addition to evaluating these four hypotheses, the paper conducts a qualitative assessment of each sectors' responsiveness to negative domestic, regional and international events.

3 The ASE and the Data

3.1 About the ASE

The ASE is Jordan's sole securities market, and is one of the oldest and largest relative to GDP in the region.[10] The Amman Financial Market (AFM), ASE's predecessor, commenced trading on January 1st 1978.[11] The AFM structure was revised in 1997 under the regulatory and legislative reforms of the new securities law under which the market was divided into three entities:

1. The Amman Stock Exchange (ASE) is the sole authorized agency to operate as a formal market for trading securities in Jordan.
2. The Jordan Securities Commission (JSC) is responsible for regulating and monitoring the issuance and dealing of securities on the ASE.
3. The Securities Depository Center (SDC) is in charge of registering securities, clearing and settling trade, settling payments and accepting shares deposits.

Accordingly, the ASE was established in March 1999 as a non-profit, private institution with administrative and financial autonomy. It is authorized to function as an exchange for the trading of securities. The exchange is governed by a seven-member board of directors. The ASE membership is comprised of Jordan's 52 brokerage firms. The market capitalization as a percent of GDP is quite high and has increased from 76% in 2001 to 234% in 2006, reaching its peak in 2005 at 327%. This extremely high ratio makes the ASE an extremely important player in the Jordanian economy with far reaching direct and spill over effects on its wellbeing. Appendix B presents key statistics about the ASE.

3.2 The Data

The data for the study was collected from the ASE's daily closing prices for all listed securities over the period from January 1995 to December 2006. In total, the data includes 414,430 lines of data on 227 security containing their trading code, daily closing prices, and sector allocation. Firms are grouped into four sector allocations: banking,

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[10] Tahsin Saadi-Sedik and Martin Petri, "The Jordanian Stock Market: Should You Invest in It for Risk Diversification or Performance?", IMF Working Paper, August 2006.

[11] http://www.jifbank.com/investment/2stock.htm

insurance, services and industrial sectors. The services sector includes firm that operate in the following sub sectors:

- Diversified Financial Services
- Real Estate
- Health Care Services
- Educational Services
- Utilities and Energy

- Hotels and Tourism
- Transportation
- Technology and Communications
- Media
- Commercial Services

The industrial sector includes firms operating in:

- Pharmaceutical and Medical Industries
- Chemical Industries
- Paper and Cartoon Industries
- Printing and Packaging
- Food and Beverages

- Tobacco and Cigarettes
- Mining and Extraction Industries
- Engineering and Construction
- Electrical Industries
- Textiles , Leathers and Clothing
- Glass and Ceramic Industries

The banking and insurance sectors do not include sub-sectors and are limited to firms operating in their main sector. Appendix B tabulates the number of listed firms within each sector, market capitalization, and foreign ownership information.

A total of thirty two violence and instability events were used and classified over three categories, domestic, regional, and international. Domestic events consist of twelve events that hit Jordan; eleven of them took place in Jordan, and the twelfth was the bombing of the Jordanian embassy in Baghdad. Regional events consist of twelve events distributed equally across Lebanon and Iraq. Finally, eight international events were investigated, four of which are in Europe, and one in each of the USA, Asia, Africa, and the Middle East.

Table 1.   Breakdown of Events by Category and Types

Event Type	Domestic	Regional		International	Count
		Iraq	Lebanon		
Bombings and explosions*	5	5	0**	7	**17**
Targeted assassinations and assassination attempts	3	0	4**	0	**7**
Change of leadership	1	0	1	0	**2**
Wars	0	1	1	0	**2**
Shootings	2	0	0	0	**2**
Hostages*	0	0	0	1	**1**
Arson	1	0	0	0	**1**
Total	**12**	**6**	**6**	**8**	**32**

* The September 11th attacks are counted as a bombing event, although they included hijacking of planes.
** The assassination of Prime Minister Rafik Al-Hariri is counted as an assassination although it conducted through bombing.

Terrorist events are identified and gathered from the Memorial Institute for the Prevention of Terrorism's (MIPT) Terrorism Knowledge Base (TKB).[12] The database is used to gather information on all terrorist events that occurred in Jordan, Iraq, Lebanon and internationally during the period of January 1996 to December 2005. Data on other major instability events that are not terrorist in nature during the same ten year period are accumulated from various media sources. The gathered terrorism and violence data is filtered to isolate politically motivated events and targets. Then the data is filtered to exclude clustered events, i.e. incidents whose event windows would overlap, in order to ensure that the measured impact belongs clearly to its allocated incident and not to other contemporaneous events. See Appendix C for a detailed list of events used in this study.

4   Methodology

4.1 The Event Study Design:

The key analytical technique behind this paper is the event study methodology. The event study starts with the assumption that stock markets are rational and therefore reflect investors' valuation of firms as soon as information becomes available. Given this rationality assumption, investors update their valuation of firms once they receive news of events that affect the valuation of these firms. Thus, the impact of an event on an economy is evaluated through measuring the response it generates in its stock market. For example, if terrorist events negatively impact the investors' perception of the attractiveness or wellbeing of the Jordanian economy, this information will be transmitted rapidly in the ASE's financial transactions.

The event study commences by describing a specific event that will be investigated and the specific equities that will be analyzed. First, the event date is established. If the event took place during the working hours of the ASE, then the day on which the event occurred is the event date. If the event took place after the working hours of the ASE or on a holiday, then the event date is the first trading day after the event.

Second, the study selects an event window which is the period during which the event is expected to affect the stock market. If the event was unexpected, such as a terrorist attack, the event window begins on the event date and it usually includes a number of days after the event date during which the event is still affecting the market performance. If the event has been expected, such as the war on Iraq in 2003, then the event window will include days before the event date to account for the effect on the stock market as a result of people's anticipation of the event. Two event windows are deployed in this particular analysis. The first one commences ten trading days before the event date under investigation and ends ten trading days after it (-10,10). This event window accounts for potential anticipation of expected events. The Iraq war, for example, was widely expected to take place prior to its opening shots, and thus investors are expected to anticipate its imminent launch and act accordingly. Additionally, this event window depicts a graphical comparison of the trend before and after the event date. The second event window commences on the event date and continues for ten days after the event (0,10). This event window focuses solely on the event and isolates potential trends prior to its occurrence.

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[12]   The Memorial Institute for the Prevention of Terrorism (MIPT) Terrorism Knowledge Base, URL:(http://www.tkb.org/AdvancedSearch.jsp).

Together, these two event windows compose clear graphical and statistical evaluation of the impact of the event of interest.

Third, an estimation period is assigned during which the "normal" performance of the stock market will be scrutinized prior to the event taking place. The estimation period commences prior to the event date in order to establish a counterfactual return for each security had the event not taken place. In this analysis, the estimation period was chosen to include the period starting one day prior to the event window and extending back to fifty trading days prior to the event window. This fifty one-day period is sufficiently lengthy to establish a robust expected return for each security. At the same time, it is not too long as to yield outdated estimates. This is especially important in the case of the ASE, which undergoes relatively sharp trends over short periods. The normal expected return of the equities which is extrapolated during this estimation period will be used to generate predictions about the future performance of these equities at the onset of the event. The difference between the actual returns of these equities during the event window vis-à-vis their estimation period's predicted returns is called the abnormal return (AR). The impact of the event on the economy and investors can be assessed using the abnormal return of the firm. If the event was well received by investors, the AR will on average be positive. If investors perceived the event as detrimental to the future valuation of the firms, the AR will be negative. Hence, by observing the ARs during the event window period and evaluating their statistical significance we can gauge the impact of the event on the economy.

There are several methods to measure the normal performance of the equities during the estimation period. The most deployed of these are the constant mean model, the market model and the factors model. This study utilizes the constant mean model for two reasons. First, the constant mean model has been found by Brown and Warner (1980, 1985) to perform as well as other more sophisticated models in their widely quoted simulated investigation of the performance of different event study methodologies. Second, while most studies focus on firm-level events such as earning announcements, this study focuses on market-level macro events such as terrorist attacks, whose effects impact the whole market and are not restricted to specific firms. Unlike other methods, the constant mean model allows for analyzing the impact of such event that affect the whole market. For example, the market return model uses the performance of the stock market to predict the performance of specific firms. Yet, when the whole market is impacted by the event, we cannot use its performance to make predictions for specific firms. Thus, the constant mean model was utilized in this study for its convenience and performance.

This model is applied to the individual returns of each of the listed companies. Thus, the results will represent un-weighted averages of all the listed companies. Therefore, the results are skewed towards the services and industrial sectors, which each compose 43% and 37% of the listed companies respectively in 2005.[13] The results are not weighted by market capitalization which would have skewed them towards the banking sector which constituted 62% of the total market capitalization in 2005.[14] An un-weighted sample is used because the study seeks to find general results that reflect the broad Jordanian

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[13] The Amman Stock Exchange. URL:(http://www.exchange.jo).
[14] *Ibid.*

economy rather than focus on a limited sample that reflects the ASE's market capitalization realities.

4.1 4.2 Measuring the Abnormal Return:

The actual return for security (i) on day (t) is calculated as the percent change in price (P) of a security from its closing price of the previous trading day:

$$R_{it} = (P_{it} - P_{i(t-1)})/P_{i(t-1)}$$

Under the constant mean model, the long run return $\overline{R}_i$ of an individual security (i) is assumed constant, and is calculated during the estimation period as the average return of security (i) during the period. Hence, the actual return R of firm (i) on day (t) is

$$R_{it} = \overline{R}_i + \varepsilon_{it}$$

Where ε_{it} is error term for security (i) during period t with the following characteristics:

$$\text{E}(\varepsilon_{it}) = 0 \text{ and Var } (\varepsilon_{it}) = \sigma^2(\varepsilon_{it})$$

Thus, the Abnormal Return (AR) of firm (i) on day (t) is equal to;

$$AR_{it} = \varepsilon_{it} = R_{it} - \overline{R}_i$$

The Average Abnormal Return (AAR) of all firms on day (t) is the average of the abnormal returns of all N firms on day (t):

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it}$$

As discussed above, this study will investigate the total impact of the event during the event period. This is done through measuring the Cumulative Average Abnormal Return (CAAR) for all firms during duration of the event window which starts on day t1 and ends on day t2:

$$CAAR_{t1,t2} = \sum_{t=t1}^{t2} AAR_t$$

4.2 4.3 Hypothesis Testing:

The statistical significance of the AAR_t and the $CAAR_{t1,t2}$ is assessed in this study using two commonly used methods. The first method has been traditionally used in event studies and places certain assumptions on the distribution of the individual firms' Abnormal Returns. This method is outlined in Binder (1998). The second method has been developed by Boehmer, Musumeci, and Poulsen (1991) to relax some of the restrictions imposed in the first method.

Method 1:

Under the null hypothesis that the event under investigation has no impact on the security, the distribution of the Abnormal Returns is assumed to be normally distributed with mean zero and variance $\sigma^2(\varepsilon_{it})$:

$$AR_{it} \sim N(0, \sigma^2(\varepsilon_{it}))$$

Furthermore, the individual AR_{it}'s are assumed to be independent and identically distributed. Finally, it is further assumed that the standard deviation of the firms' abnormal returns remains unchanged during the event window period. That is, the event affects the mean only but leaves other parameters unchanged. Hence, the AAR_t's standard deviation ($\sigma(AAR_t)$) is estimated by calculating the standard deviation of the AR_{it} of each security on the same day (t) and divided by the square root of the number of firms (Binder 1998). Under the assumption that the AR_{it} are normally distributed, the estimated standard deviation of AAR_t has a t-distribution (Binder 1998):

$$\sigma(AAR_t) = \sigma(AR_t)\big/\sqrt{N}$$

The statistical significance of the AAR_t is then tested through:

$$Z_1 = AAR_t \;/\; \sigma(AR_t)\big/\sqrt{N}$$

The $CAAR_{t1,t2}$'s standard deviation ($\sigma(CAAR_{t1,t2})$) is calculated from the cross section estimate of the AAR_t standard deviation as follows (Binder 1998):

$$\sigma(CAAR_{t1,t2}) = [\sum_{t1}^{t2}\sigma^2(AAR_t)]^{1/2}$$

The test statistic is constructed as:

$$T_1 = (CAAR_{t1,t2})/[\sum_{t1}^{t2}\sigma^2(AAR_t)]^{1/2}$$

Method 2:

Recent event studies have utilized a new approach to address the assumptions limitations of the first method. Specifically, Brown and Warner (1980 and 1985) in addition to Brown, Harlow, and Tinic (1988) find that several events have actually changed the standard deviation of the abnormal returns during the event period in addition to changing the mean. The new approach does not depend on the assumption of an unchanged standard deviation. It constructs the Standardized Abnormal Returns (SAR) for each security by dividing the security's return on its standard deviation. The latter is estimated from its abnormal returns during the estimation period.

$$SAR_{it} = AR_{it} / \sigma_i$$

To test the null hypothesis that the abnormal returns for all N firms on day t of the event period are equal to zero we construct the test statistic $Z_2 = (\sum_{i=1}^{N} SAR_{it}) / \sqrt{N}$.

Boehmer, Musumeci, and Poulsen (1991) construct a different approach to test the hypothesis that the Standardized Cumulative Abnormal Returns (SCAR) for all firms during the whole event window is equal to zero. Their test is:

$$T_2 = \frac{\dfrac{1}{N}\sum_{i=1}^{N} SCAR_{it2}}{\sqrt{\dfrac{1}{N(N-1)}\sum_{i=1}^{N}(SCAR_{it2} - \overline{SCAR})^2}}$$

where $SCAR_{it2}$ is the standardized cumulative abnormal return for security *(i)* over the whole event window period starting on day t_1 and ending on t_2. $\overline{SCAR}$ is the cross section average of the N securities $SCAR_{it2}$. The test statistic T_2 is asymptotically distributed as a standard normal variable.

5 Results

5.1 Overall Results and Tested Hypotheses

The CAARs for the regional, domestic, and international events follow clearly divergent paths. The CAAR for regional terrorist and instability events increases upon the occurrence of the event and follows an upward trend. The CAAR ends at 1.85% and 2.73% for the (0,10) and (-10,10) days event windows respectively. Both results are statistically significant at the 99% significance level using the two methods T1 and T2. On the other hand, the CAAR for domestic terrorist and instability events is not significantly affected by the events. The value for the domestic CAAR at the end of the event windows is 0.36% and 0.50% for the (0,10) and (-10,10) days event windows respectively. Neither result is statistically significant at the 99% or 95% significance level for either of the two testing methods T1 and T2. Finally, the CAAR for international terrorist and instability events follows a downward trend upon the occurrence of the event. The CAAR ends at -2.07% and -2.79% for the (0,10) and (-10,10) days event windows respectively. Both results are statistically significant at the 99% significance level using the two methods T1 and T2. The complete AAR and CAAR results along with their tests using the two methods described above for each day in the event windows are listed in appendices D and E. The trends that the CAARs follow for both event windows are depicted in figures 1 and 2 below. The CAAR for each individual studied event is tabulated in Appendix F.

Thus, the analysis showed that the first hypothesis is upheld: the ASE reacts to negative domestic, regional and international events. The stock prices react clearly to the turbulent events under investigation. In the case of international and regional events, the events left an impact throughout the whole event window period. On the other hand, the ASE reacted to domestic events on the event day, but this reaction was not upheld throughout the event window. Thus, overall the study showed that the ASE incorporates new information about fundamental changes in the expectation for future profits for listed companies. Thus, it can be said that the ASE responded to regional and international events permanently, and to domestic events in a transitory way.

Average CAARS By Region - Event Window (0,10) Days

Average CAARS By Region - Event Window (-10,10) Days

The second hypothesis states that the ASE will react negatively to domestic adverse events. However, the ASE did not react negatively in a statistically significant way over the event period for domestic events. ASE's reaction to domestic events dissipated the day after the event date. The rapid recovery of the ASE can be indicative that investors

assessed domestic negative events as short term idiosyncratic shocks that did not evidence permanent instability. Therefore, the second hypothesis fails to hold over the entire event window.

The third hypothesis states that the ASE will react negatively to international adverse events. The ASE did indeed react negatively to shocks in complementary international economies. The reaction lasted throughout the event window period and is statistically significant. Thus, the third hypothesis holds.

Finally, the fourth hypothesis states that the ASE will react positively to adverse regional events. Indeed, the study documents the ASE's positive reaction to regional shocks as predicted by the substitution framework relation. The fourth hypothesis holds.

The hypotheses results can be seen as evidence that ASE investors viewed regional and international events as long term shocks. However, they viewed domestic shocks as temporary anomalies and did not extrapolate them to downgrade their assessment of the Jordanian economy. A cross section regression of the CAAR for the (0,10) days event window on the category of the event (regional, domestic or international) holding other attributes such as its type, date, and fatalities constant confirms the observed result. A regional event increases the CAAR by 2.5%, and an international one decreases it by 3.5% *ceteris paribus*. Both results are statistically significant at the 90% level. This significance level is pretty strong in light of the study's small number of observations. Thus, the third and fourth hypotheses regarding international and regional events hold.

Table 2.   Regression Results Of The CAAR Against The Events' Attributes

Linear regression					Number of obs = 32	
					R-squared = 0.4770	
					Root MSE = .02585	
caar	**Coef.**	**Robust Std. Err.**	**Robust t**	**P>|t|**	**[95% Conf. Interval]**	
regional	**0.025006**	0.014292	**1.75**	**0.095**	-0.00472	0.054727
international	**-0.03473**	0.018978	**-1.83**	**0.081**	-0.0742	0.004737
fatalities	2.18E-06	1.53E-06	1.42	0.17	-1.01E-06	5.37E-06
date_trading	-1.4E-05	1.01E-05	-1.41	0.174	-3.5E-05	6.78E-06
bombing	-0.05857	0.023701	-2.47	0.022	-0.10785	-0.00928
assassination	-0.0512	0.026285	-1.95	0.065	-0.10586	0.003464
leader_change	-0.08162	0.029213	-2.79	0.011	-0.14237	-0.02087
war	-0.10101	0.056045	-1.8	0.086	-0.21756	0.015541
shooting	-0.08949	0.041337	-2.16	0.042	-0.17546	-0.00353
arson	-0.09507	0.037847	-2.51	0.02	-0.17378	-0.01637
_cons	0.283843	0.176821	1.61	0.123	-0.08388	0.651562

5.2 Sectoral CAARs

Following is a discussion for the each sector's results in the (0,10) event window. The sectoral CAAR for domestic events at the end of the event window does not display a statistically significant change for any of the four sectors at the 95% significance level. It is only significant at the 90% level for the insurance sector. The sectoral CAAR for regional events for the industrial and services is positive with statistical significance increase at the 99% level. It is not significant for the banking and insurance sectors at the 90% level. The sectoral CAAR for international events is negative for all sectors. This decrease is significant for the insurance sector at the 95% level and for all other sectors at

the 99% level. The end of window CAAR for each sector is listed in Table 3 and the graphical evolution of the CAAR is depicted below. The complete daily evolution of the CAAR per sector is listed in Appendix H.

The Banking Sector:

The banking sector's CAAR for domestic events drops on the event day by 0.44%, which is statistically significant at the 95% level. It recovers over the remainder of the event window to end it at 0.22%, which is not statistically significant at the 90% level. The CAAR for regional events drops on the event day by 0.41% but recovers over the event window to end it with a statistically not significant 0.78%. The CAAR for international events drops on the event date by 0.55%. It continues to drop ending the event window period with -4.02% which is significant at the 99% confidence level.

The Industrial Sector:

The industrial sector's CAAR for domestic events drops -0.22% on the events day, which is statistically significant at the 99% level. However, it recovers over the event window to end it at 0.19% which is not statistically significant at the 90% level. The CAAR for regional events does not start with a statistically significant change, but it soon increases and closes at 1.81% which is statistically significant at the 99% level. The International CAAR starts with a statistically significant drop of 0.65%. It ends the event window at -1.28% which is statistically significant at the 99% level.

The Services Sector:

The services sector's CAAR for domestic events starts with a statistically significant drop on the event day. It recovers over the event window to end it at 0.57% which is not statistically significant at the 90% level. The CAAR for regional event does not start the event window with a statistically significant change. However, over ten days the CAAR ends with a 2.99% rise, which is statistically significant at the 99% level. The CAAR for international events starts and ends with statistically significant drop at the 99% significance level, ending with a decrease of -3.39%.

The Insurance Sector:

The insurance sector's CAAR for domestic event starts with a statistically insignificant change. It rises to 0.60% over the course of the window which is significant at the 90% level. The insurance CAAR for regional events starts and ends with statistically insignificant changes at the 90% level. The insurance sector's CAAR for international events starts with a statistically insignificant change. It drops to -0.82% at the end of the event window which is statistically significant at the 95% level.

Table 3.   End of (0,10) Days Event Window CAAR by Sector

Sector	Domestic		Regional		International	
	CAAR	**T1**	**CAAR**	**T1**	**CAAR**	**T1**
Banking	0.22%	0.26	0.78%	1.29	-4.02%	-5.66 ***
Industrial	0.19%	0.77	1.81%	5.10 ***	-1.28%	-3.38 ***
Services	0.57%	1.05	2.99%	6.22 ***	-3.39%	-8.07 ***
Insurance	0.60%	1.68 *	0.29%	0.54	-0.82%	-2.30 **

*   indicates test result is significant at the 90% level, ** at the 95% level, *** at the 99% level.

Average CAAR of Each Sector By Region

(-10, 10) Days
Banking Sector

Banks Average All CAAR (-10,10) Days
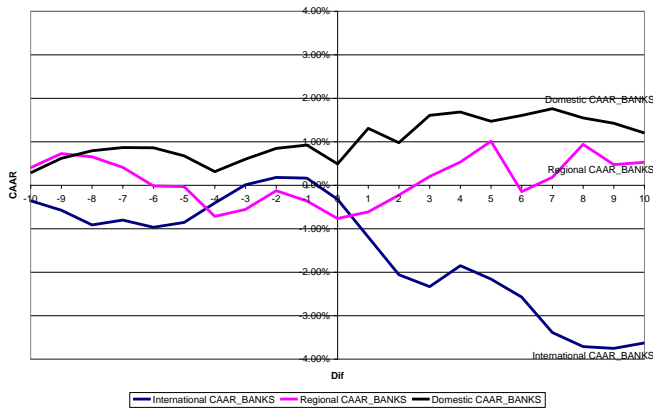
(0, 10) Days
Banking Sector

Banks Average All CAAR (0,10) Days
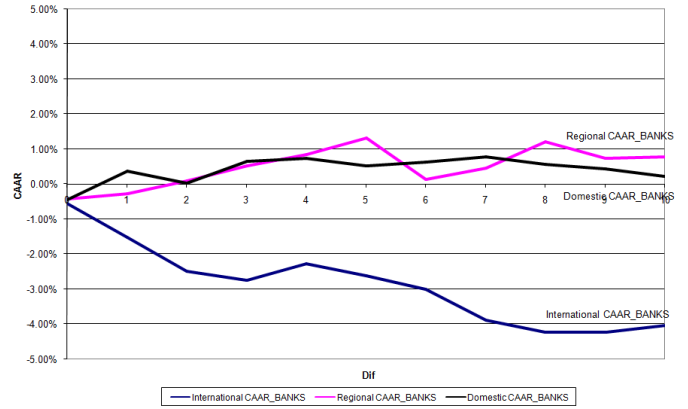
Industrial Sector

Industrial Average All CAAR (-10,10) Days
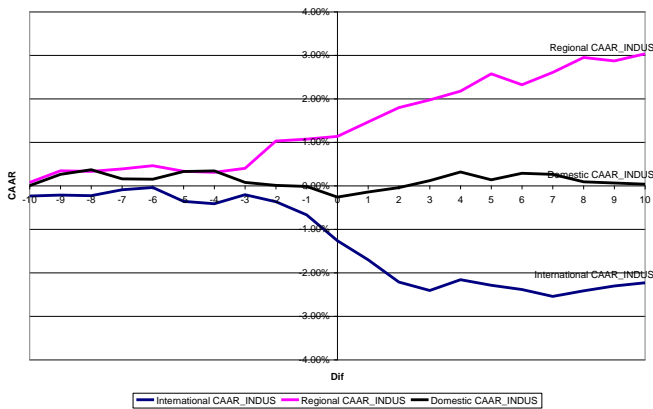
Industrial Sector

Industrial Average All CAAR (0,10) Days
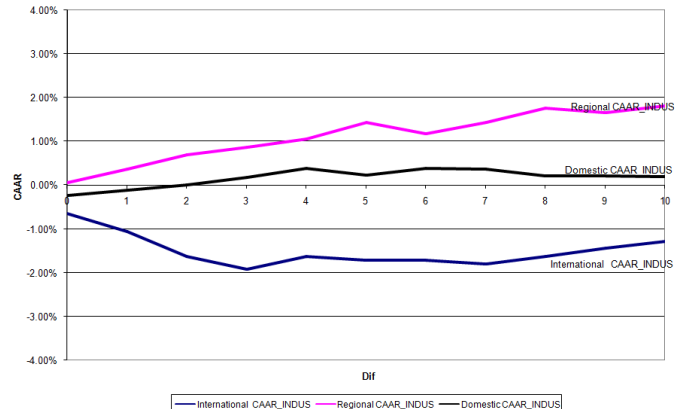
Services Sector

Services Average All CAAR (-10,10) Days
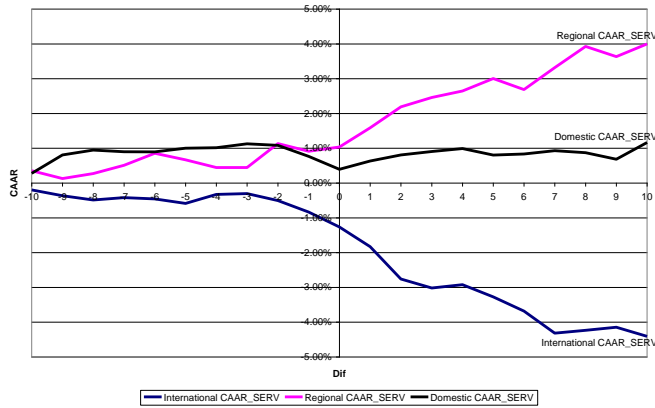
Services Sector

Services Average All CAAR (0,10) Days
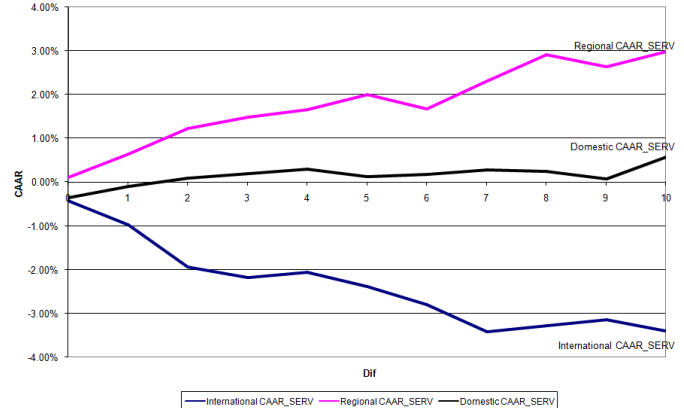
Insurance Sector

Insurance Average All CAAR (-10,10) Days
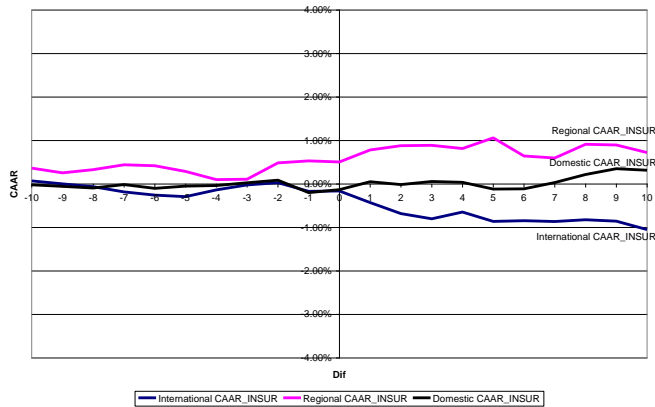
Insurance Sector

Insurance Average All CAAR (0,10) Days
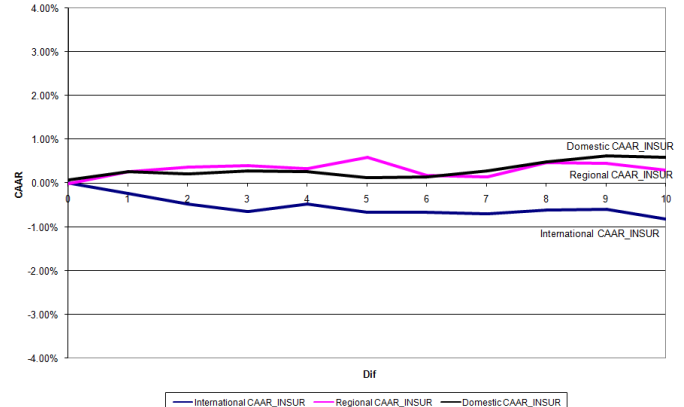
6 Interpretation

6.1 Reaction to Events

The ASE market clearly reacts to violence and instability events in the form of a departure from its previous trend on the event date. The reaction of the ASE to such events is indicative of its incorporation of new information into the valuation of its companies. However, the ASE's reaction to such events differs depending on the origin of the event. Domestic events trigger a small but statistically significant negative immediate impact on the event date. On average, the market drops -0.24% on that date. This drop is statistically significant at the 99% level. The ASE, however, recovers fairly quickly and reverses its exact losses on the day after the event date. On that day, it registers an increase of 0.24% which is also statistically significant at the 99% level. This recovery lasts through the ten day period of the event window and the CAAR for domestic events closes at a statistically not significant increase of a mere 0.36%. The ASE's ability to recover from such negative events can be seen from a rational market framework. As such, investors identify that while such events carry a negative emotional

impact, they do not change the economic fundamentals of the listed companies and the investment outlook for Jordan. Additionally, it can be further viewed from a behavioral finance point of view as a rally around the flag effect. In this case, large investors demonstrate their support for the country at this testing time by publicly investing in the ASE. Other investors may follow as part of a herding effect or an effort to realize profits from the switch in trends.

For example, the heads of Jordan's insurance companies met on November 10th prior to the resumption of trade at the ASE and publicly agreed to raise the stock market through increased demand and refraining from selling their portfolios.[15] Additionally, on November 17th the head of one of the largest regional real estate firms operating in Jordan announced that "the company will not be thwarted by the recent attacks … and will increase their investment pace".[16] The same message was reiterated by a number of Jordan's leading investors. For example, Al-Rai newspaper published interviews with twenty two such leading investors on November 11th who publicly committed to continue their trust and investment in the economy.[17] On November 12, 2005 the same newspaper published a news article about a conference that was held by a number of leading investors to express their public trust in the economy and their plans for increased investment. The newspaper published interviews with eight of them.[18]

However, government interference in the market to bring it back to its prior equilibrium must be ruled out in order to reach a solid conclusion regarding this investor' behavior. Jordan's Securities Depository Center publishes data on equity transaction of various investor category. The data shows that the Jordanian government did not buy any equity during the twelve months following the hotel bombings of November 2005. Additionally, the possibility that the government stabilized the market after the bombings through a quasi-governmental institution like the Social Security Department seems remote. Individuals represent by far the largest category of buyers and sellers in the market with 75% of overall transactions during November and December 2005. The second largest are companies with 21% of transactions. The remaining 4% of transactions were conducted by institutions, mutual funds, joint accounts and organizations in decreasing order.[19] Thus, the government is most probably not able to positively affect the market through its quasi-agencies even if it tried to due to their small share of the conducted transactions. Having ruled out government interference in the market post Jordan's largest terrorist attack strengthens the conclusion that the ASE recovers rapidly from negative domestic shocks. This usually occurs within a day from hearing the news about the event.

As for regional effects, unlike the ASE's reaction to domestic events, the market does not process the impact of the negative regional events immediately upon hearing the news on the event date. This is evidenced by a statistically not significant AAR on that

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[15] Al-Rai Newspaper article on November 11, 2005.
URL:(http://www.alrai.com/print.php?news_id=61797).

[16] *ibid* , November 17, 2005. URL:(http://www.alrai.com/pages.php?news_id=62939).

[17] *ibid*, November 11, 2005. URL:(http://www.alrai.com/pages.php?news_id=61735).

[18] *ibid*, November 12, 2005. URL:(http://www.alrai.com/pages.php?news_id=61897).

[19] Jordan's Securities Depository Center,
URL:(http://www.sdc.com.jo/english/index.php?report_type=16&security_type=1&year=2005&month=11
&option=com_public&Itemid=28)

day. However, on the following day, the ASE starts registering statistically significant increases in its AAR leading to an increase of 1.85% after the ten day window period. This result is quite significant at the 99% significance level for the two event windows. Thus, on average investors receive news about regional terrorist and instability events in Iraq and Lebanon with the anticipation that they will benefit the Jordanian economy through a substitution effect. In fact, to the best of my knowledge, this is the first positive documented impact of such negative events on a whole economy. The investors' positive reaction to such events runs against general wisdom as believed by most Jordanian policy makers. A USAID report documents this uninformed belief. In a meeting with Jordan's Minister of Industry and Trade and Minister of Finance, the ministers "wonder if Jordan must offer something more to investors than its competitors, in order to compensate for the fact that it is located in a volatile geopolitical environment".[20] This concern was a driving motive behind the launch of their study.

The positive reaction to such regional events can be explained as a result of expecting more investments to be diverted to Jordan from the afflicted countries. In fact, as a result of the Iraq war, a large number of Iraqis migrated to Jordan, which led to a sharp rise in the prices of real estate as can be seen in Figure 4 below. Additionally, investors expected Jordanian industry and services firms to benefit from the large demand of goods and services that was expected from Iraq. The thirteen years of strict embargo on Iraq deprived its citizens and firms from such goods. Thus, they were correctly expected to satiate their large demand through their key gateway, Jordan. Furthermore, Jordan and its subcontractors were expected to profit from the US's grand reconstruction schemes of post war Iraq. As Iraq's instability grew, an increasing share of Iraq's reconstruction operations and other international services were diverted and based in Jordan, thus boosting its economy. Increased instability in Iraq signaled increased business reallocation to Jordan to investors.

Foreign Real Estate Investments in Jordan During the Month of September 2001-2005[21]

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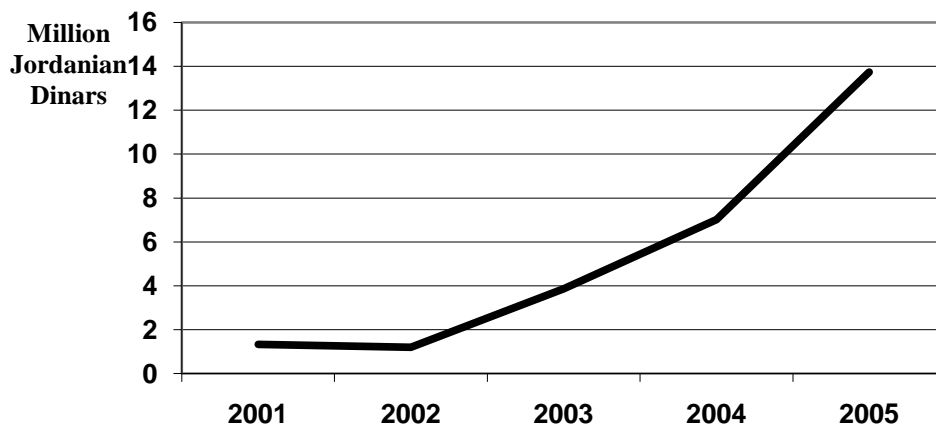
[20] Duanjie Chen, Reilly Eugene, Afram Gabi, Al-Nashef Amal, Dababneh Rana, "Overview of Non-fiscal Measures to Attract Investment", Achievement of Market-Friendly Initiatives and Results Program, USAID, August 2004.

[21] Jordan's Department of Land and Survey, September 2005 Monthly Report, URL: (http://www.dls.gov.jo/uploads/state-month9.doc)

As for Lebanon, following the recent instability in Lebanon and its pursuant expected ramifications on Syria which is widely accused of orchestrating the assassination of Hariri. Jordan experienced an increase in Lebanese and Syrian investments, especially in real estate. During September 2005, Syrians had the second highest foreign purchase of real estate in Jordan, second only to Iraqis.[22] Additionally, a large proportion of Syrians traditionally held financial assets in Lebanon. This is due to Syria's stringent financial regulations, Lebanon's geographical proximity, and the then porous borders between the two countries. Thus, as the relations between the two countries became very tense in the wake of the Hariri assassination, and concerns were rising regarding a potential military operation against Syria, many Syrians chose to divert their financial assets to Jordan. In November 2005 Syria decided to allow foreign ownership of its financial institutions. This decision came as fears of a military action against it were growing few months after Hariri's assassination. The decision was rationalized by the media as an effort to bring back Syrians assets' that have been fleeing to Jordan and Lebanon.[23] Furthermore, Jordan competes with Lebanon for regional investments and tourism. Thus, as events make Lebanon an increasingly unstable country; investors expect Jordan to receive a share of the diverted Arab investments and tourism that were diverted from Lebanon. In 2005 following the Hariri assassination the total number of tourists from the Gulf Cooperation Council Countries increased 20% from the previous year.[24]

With regards to international events, the market digests negative news fairly quickly, translating it into statistically significant drops in its AAR on the day of the event and the following days. These drops lead into a -2.07% CAAR by the end of the period which is statistically significant at the 99%. The immediate negative reaction to domestic and international negative events versus the lagged positive response to regional adverse events and their respective magnitudes is consistent with behavioral evidence. Existing research document the observation that losses loom larger than gains. Also, people respond stronger and faster to negative effects than positive ones. In this light, investors respond immediately to domestic and international events that hurt the Jordanian economy. However, their reaction to regional effects that positively impact the economy is delayed by one day. Furthermore, their reaction to regional events is on average smaller than that of international ones in absolute terms, -2.07 vs. 1.85% respectively for the (0,10) window.

It could be argued that the market's rapid and negative reaction to such international events is a function of the wide media coverage of these large turbulent events. Nonetheless, it should be noted that the market was able to recover from similar large negative domestic shocks. For example, the ASE registered a -0.98% AAR drop on the day of the hotel bombing on November 9, 2005 which left 63 people dead, making it the largest terrorist attack in Jordan's history. Yet, by the following trading day, the ASE reversed its exact losses by increasing its AAR by 0.98%. By the end of the period, the CAAR does not register a statistically significant change from its previous trend at the

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[22] Jordan's Department of Land and Survey, September 2005 Monthly Report, URL: (http://www.dls.gov.jo/uploads/state-month9.doc).

[23] Al-Qabas Kuwaiti newspaper article on November 4, 2005. URL:(http://www.alqabas.com.kw/Final/NewspaperWebsite/NewspaperPublic/ArticlePagePrint.aspx?Artic leID=77962).

[24] Jordan's Ministry of Tourism and Antiquities, URL(://www.tourism.jo/).

90% level. On the other hand, the ASE registered its largest drop out of all the analyzed events of -10.93% over a similar ten day period following the London bombings that left 27 people dead. Hence, the market is registering such negative drops to international events as result of its expectation that these negative shocks will hurt the future prospects of the listed companies and the Jordanian economy. It is not merely reacting to the extensive media coverage of these international events.

The September 11th attacks against the US triggered a wave of anti-Arab and anti-Muslim sentiments that was feared to have serious future ramifications. Following these attacks a serious of banking, shipping, travel, and other restrictions against Arab and Muslim countries went into effect. Clearly, these policies hurt the Jordanian economy. The banking sector was forced to revise its operations to cut back on potential money laundering loop holes. In fact, on August 17th 2005, the Arab Bank, which has by far the largest market value in the ASE, was fined $24 million by the US. The fine was due to the Bank's failure to "implement an adequate anti-money laundering program to comply with the Bank Secrecy Act and manage the risks of money laundering and terrorist financing in connection with United States dollar clearing transactions."[25] Indeed, the banking sector suffered the greatest impact from the 9/11 attacks, dropping -11.68% in ten days. The impact on other sectors from adverse international events can be seen from a rational stance as a result of the negative ramifications on bilateral trade with the impacted countries. From a behavioral point of view, it can be explained by the herding effect which led investors to downgrade their valuation of other sectors following the visible drop in the banking sector. After all, the banking sector is by far the largest sector in terms of market value with 62% of total market capitalization.[26] Thus, the market is highly attuned to its movements.

6.2 Market's Incorporation of News

The ASE rapidly incorporated news of the studied negative events under study into its valuation of listed companies. In fact, the ASE anticipated expected events and started reacting to them prior to their actual event date. For example, the CAAR for the Iraq War deviates from its past trend two days prior to the actual opening strike against Iraq. The two day period clearly corresponds with President Bush's 48 hour ultimatum to Saddam Hussein to leave the country on March 18, 2003. This ultimatum at the highest public levels made the fog of war loom credible.
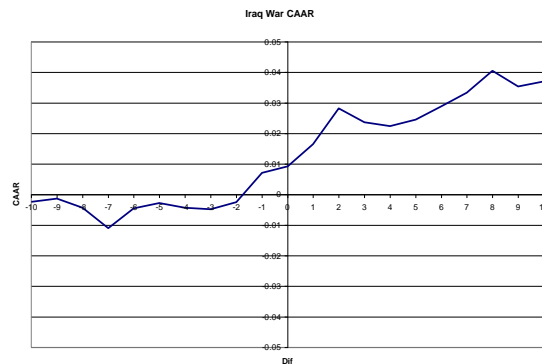

A second example is the ASE's ability to absorb the severe emotional shock of King Hussein's death even prior to his actual passing away. King Hussein's sickness abruptly resurfaced on January 25th, 1999 as signaled by his sudden return to Mayo Clinic for

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[25] The US Office of the Comptroller of the Currency – US Department of Treasury website.
URL:(http://www.occ.treas.gov/ftp/release/2005-80.htm).
[26] The Amman Stock Exchange.

further treatment only few days after his triumphant recovery and return to Jordan. As a result, the CAAR drops on January 26th and continues to do so for eight days until the actual day of King Hussein's death. Thus, while the CAAR for the (0,10) day event window ends with a statistically not significant 0.40%, the (-10,10) day window ends with a -1.98% drop reflecting the incorporation of the impact of King Hussein's death prior to his actual death.
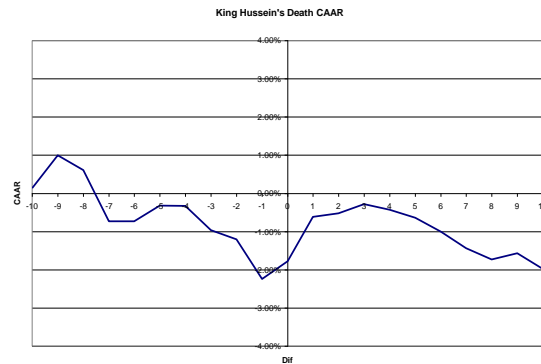
A third example arises from the Israeli attack against Lebanon in 1996, code named, "Grapes of Wrath". The trigger for the operation occurred on April 8th, 1996 after an Israeli roadside bomb killed a 14-year old Lebanese boy. This led Hezbollah to respond by shelling northern Israeli with missiles. Israel retaliated on the same day by an attack on the village of Khirbat Salim, and Hezbollah killed an Israeli soldier and injured others in a counter attack the next day.[27] On April 11th, Israel launched its wide scale operation which killed 154 Lebanese civilians and displaced around half a million.[28] The CAAR for this event reflects the sophistication of investors in predicting the event on April 8th, three days prior to the actual event date as the CAAR started rising.
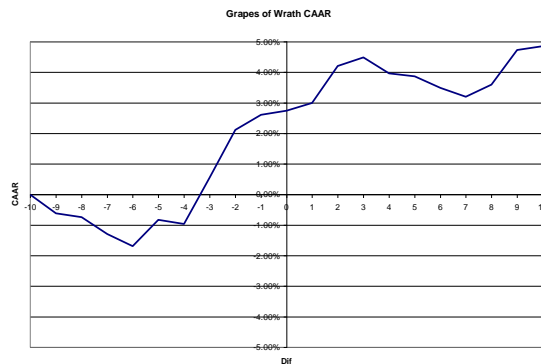
Thus, investors in the ASE demonstrate an ability to anticipate expected events and react to them prior to their actual occurrence. This leads to incorporating available information in the market and eliminating the potential for arbitrage on the event date. These are strong indications of the market's efficiency.

7 Policy Recommendations

Regional Terror and Instability Events:

ASE investors do not perceive regional instability and terrorism in Iraq and Lebanon as a threat or obstacle in the face of the Jordanian economy. On the contrary, they react positively to such regional events. Thus, Jordanian policy makers should not be primarily concerned with short term interventions to stabilize the economy in the wake of such attacks. Their economic reform agenda should not be held hostage to regional instability. Instead, Jordan should capitalize on its position as a stable country within a regional sea

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[27] Amnesty International Report "Unlawful Killings During Operation Grapes of Wrath", July 1996; URL: (http://web.amnesty.org/library/index/ENGMDE150421996).
[28] Wikipedia, Operation Grapes of Wrath,
URL:(http://en.wikipedia.org/wiki/Operation_Grapes_of_Wrath), (as of Feb. 27, 2007, 01:09 GMT).

of instability. The current constellation of circumstances puts Jordan in a particularly advantageous position to attract regional investment. First, there is a regional excess of oil money in the Gulf countries. Second, Arab investors are looking for regional investment opportunities due to the post 9/11 limitations of investing in the West, as highlighted by the failed Dubai sea ports acquisition deal in the US. Third, there is uncertainty surrounding a key competing destination, Lebanon. Fourth, Jordan continues to be the base for the restructuring of Iraq effort. Thus, the Jordanian policy makers should capitalize on Jordan's favorable reaction to negative regional instability in promoting it as an attractive and low-risk regional investment destination.

Domestic Terror and Instability Events

Following the November 9th, 2005 attacks against hotels in Amman, a new cabinet of old guards led by a former security chief took over. However, this study shows that investors' perspectives of the Jordanian economy are not hindered by domestic terror and instability events. Investors continue to believe in the vitality of the economy following such negative events and recover from the emotional shock of the attack fairly quickly. Their behavior evidences the belief that such events are idiosyncratic shocks rather than a permanent change in Jordan's security. Thus, in response to domestic terror and instability events, Jordanian policy makers should not interfere with the ASE. Such interference could send wrong signals to investors regarding the free operation of the market. Additionally, Jordan should not trade off economic openness, rule of law, and transparent institutions for increased security to protect the economy. Rather, Jordan should focus on long term economic reforms and vision instead of short term interventions. Investors continue to believe in Jordan's future security and stability following such events.

International Terror and Instability Events:

This study shows that the ASE responds negatively only to international turbulent events. Furthermore, the banking sector suffers most as a result of such events. Hence, Jordanian policy makers should encourage banks to reform their operations to comply with international best practice in the fields of money laundering and other such security concerns. Also, Jordan should engage its main trading and economic partners in negotiations to ease restrictions on transport and shipment that have been put in place post 9/11 while simultaneously addressing their security concerns.

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Appendix B.   Key Statistics of the ASE and its Sectors[29]

Table 4.   Key Statistics of the ASE

	2001	2002	2003	2004	2005	2006
Number of Listed Companies	161	158	161	192	201	227
Market Capitalization (JD million)	4476.7	5029.0	7772.8	13033.8	26667.1	21078.2
Value Traded (JD million)	668.7	950.3	1855.2	3793.2	16871.0	14209.9
Average Daily Trading (JD million)	2.8	3.8	7.7	15.4	69.1	58.7
No. of Traded Shares (million)	340.6	461.8	1008.6	1338.7	2582.6	4104.3
No. of Transactions (Thousand)	295.5	448.6	786.2	1178.1	2392.5	3442.6
No. of Traded Days	241	249	241	246	244	242
Turnover Ratio (%)	20.3	26.6	49.1	58.2	94.1	101.1
ASE Weighted Price Index (point)	1727.0	1700.2	2614.5	4245.6	8191.5	5518.1
ASE Free Float Weighted Price Index (point)	1060.6	1090.9	1761.5	2729.1	4259.7	3013.7
ASE Un-Weighted Price Index (point)	646.0	691.7	1117.5	1535.9	2171.0	1608.1
No. of Traded Bonds (Thousand)	89.0	49.4	72.3	10.4	3.4	1.2
Value of Traded Bonds (JD million)	7.2	9.7	11.7	6.0	3.1	1.9
P/E Ratio (times)	15.3	13.0	21.7	31.1	44.2	16.7
P/BV (times)	1.4	1.2	1.9	2.7	3.2	2.9
Dividend Yield Ratio (%)	2.7	3.2	2.4	1.7	1.6	2.3
Non-Jordanian Ownership of Market Cap. (%)	38.5	37.4	38.8	41.3	45.0	45.5
Net Investment of Non-Jordanian (JD million)	(107.5)	0.9	81.8	69.0	413.0	180.6
Market Capitalization / GDP (%)	75.7	80.4	116.8	184.7	326.6	233.9

Table 5.   Each Sector's Number of Listed Firm and Market Capitalization

Sector	Listed Firms		Each Sector's Market Capitalization Ownership by Nationality			Each Sector's Total Market Capitalization	
	Number	% of all listed firms	Nationality	Value (Million USD)	%	Value (Million USD)	%
Banking	16	8%	Jordanian	$10,518	45	$23,137	62%
			Arab	$11,243	49		
			Foreign	$1,376	6		
Insurance	25	12%	Jordanian	$678	81	$840	2%
			Arab	$75	9		
			Foreign	$87	10		
Services	92	43%	Jordanian	$6,688	89	$7,550	20%
			Arab	$733	10		
			Foreign	$129	2		
Industry	79	37%	Jordanian	$3,564	63	$5,672	15%
			Arab	$1,055	19		
			Foreign	$1,054	19		
All Sectors	212	100%	Jordanian	$21,448	58	$37,199	100
			Arab	$13,105	35		
			Foreign	$2,646	7		

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[29] The Amman Stock Exchange. URL:(http://www.exchange.jo)

Appendix C. List of Used Events

Country	Event Name	Event Details	Category	Date of Trading	Date of Event	Fatalities
Jordan	Shooting of Israeli Children	A 26 year old Jordanian soldier (Ahmed Dagamseh) killed seven Israeli children at a park. The gunman was sentenced to life in prison in July.	Domestic	15-Mar-1997	13-Mar-1997	7
Jordan	Shooting Israeli Embassy Guards	Two Israeli Embassy security guards were killed in a drive-by shooting in Amman. The Jordanian Islamic Resistance claimed responsibility. They demanded the release of the Jordanian soldier who is serving a life sentence for killing seven Israeli children. They also demanded that Israeli diplomats leave Jordan within a month.	Domestic	22-Sep-1997	22-Sep-1997	2
Jordan	Bomb at Security Personnel	A Syrian citizen, Ahmad Jalal, hurled a bomb at Jordanian security men in Jabal al-Akhdar in the capital Amman. The explosion resulted in material damage to the road outside a private school and to two civilian vehicles. Note: The Jordanian Interior Ministry announced that an armed group infiltrated Jordan to launch attacks on US and Israeli targets there.	Domestic	18-Feb-1998	18-Feb-1998	Unknown
Jordan	Burning Car of Intelligence Chief	The car of former Jordanian Intelligence Chief Mohammed Kilani was set on fire outside his home. Note: A car belonging to Abdel Rahim al-Kilani, one of Mohammed's sons was set on fire last year, a few days after the former intelligence chief was appointed by King Hussein to investigate the Israeli schoolgirl killings.	Domestic	28-Apr-1998	28-Apr-1998	0
Jordan	Death of King Hussein	King Hussein died from cancer on Feb 7, 1999. He returned back to Jordan on Jan 19, 1999 after spending months in the US for treatment. His health condition quickly relapses and he return to the US for treatment on Jan 25, 1999.	Domestic	7-Feb-1999	7-Feb-1999	1

Jordan	Assassination Attempt on Israeli Diplomat	An Israeli diplomat was shot and injured in the Jordanian capital. Shlomi Ratzabi was hit in the left leg by gunfire as he drove near the 7th circle in Amman's Shamhani neighborhood. A group calling itself the Movement for the Struggle of the Jordanian Islamic Resistance claimed responsibility for the attack, the second on Israeli diplomats in Jordan in two weeks.	Domestic	6-Dec-2000	5-Dec-2000	0
Jordan	Assassination of Israeli Businessman	An Israeli businessman Snir and diamond dealer, Yitzhak Snir, was shot and killed outside his apartment in Amman. Two radical Arab groups claimed responsibility, but Jordanian officials said the killing might have been criminal in nature.	Domestic	7-Aug-2001	6-Aug-2001	1
Jordan	Explosion at Intelligence Chief's House	An explosion went off opposite the house of the head of the department responsible for combating terrorism in the General Intelligence Directorate. The explosion killed two passers-by (an Egyptian and an Iraqi) and damaged several cars, including that of the targeted intelligence officer's wife.	Domestic	28-Feb-2002	28-Feb-2002	2
Jordan	Assassination of USAID Employee	Laurence Foley, a US Agency for International Development (USAID) employee in Jordan, was gunned down outside his home in the capital city of Amman. This is the first time a Western diplomat has been assassinated in Jordan. Jordanian officials point to Al-Qaeda while the Israelis suggest possible Iraqi involvement.	Domestic	28-Oct-2002	28-Oct-2002	1
Jordan	Bombing the Jordanian Embassy in Baghdad	A large car bomb exploded at the Jordanian Embassy in Baghdad, killing nineteen and injuring over fifty others. The blast also damaged the outside façade of the building. As a result of the attack, Jordanian embassy staff were moved to the city of Fallujah to continue business. No group ever claimed responsibility for the attack, though authorities speculate it could be the work of the group Ansar al-Islam	Domestic	7-Aug-2003	7-Aug-2003	19

Jordan	Shooting Rockets in Aqaba	Four men of Egyptian and Iraqi nationality fired three Katyusha rockets from a warehouse in Jordan targeting two US Navy Ships, the USS Ashland and the USS Kearsarge, which were docked in port of Aqaba, an airport in a nearby Israeli port, and a hospital in a Jordanian hospital.	Domestic	22-Aug-2005	19-Aug-2005	1
Jordan	Bombing Three Hotels	A suicide bomber attacked the Grand Hyatt in Amman as part of a coordinated attack on three western hotel chains that killed 63 people (including three perpetrators) and wounded more than one hundred. The bombing occurred within seconds of attacks on the Radisson SAS and Days Inn hotels. The explosive device of a female suicide bomber at the Radisson SAS failed to go off. She fled the scene and was later arrested in the Jordanian city of Salt. Authorities captured her and she made a full confession on Jordanian television. Al Qaeda in Iraq, led by Abu Musab al-Zarqawi, claimed responsibility for the attack.	Domestic	14-Nov-2005	9-Nov-2005	63
Kenya & Tanzania	Bombing US Embassy in Kenya	A suicide car bomb exploded outside the US Embassy in Nairobi, Kenya, killing at least 213 people, including 12 US nationals, and injuring more than 5,000 people. It is unclear how many Americans were injured in the attack. The blast occurred almost at the same time that another suicide car bomb detonated outside the US Embassy in Dar es Salaam, Tanzania. At least ten people were killed in that attack, none of them Americans.	International	8-Aug-1998	7-Aug-1998	213
Russia	Apartments Bombings in Moscow	An explosion occurred at an apartment building on Kashirskoye Highway on September 13, the day intended to be a national day of mourning for the victims of the Buinaksk and Moscow bombing over the past few weeks. The explosive used in this attack was found to be almost identical to that used in the Guryanov Street blast. Two more crates of unexploded explosives were found in the rubble of the house, delaying the rescue operation.	International	13-Sep-1999	13-Sep-1999	121

Yemen	Bombing USS Cole	A small boat that was helping the US Navy destroyer, USS Cole to moor, exploded as the USS Cole was in the Yemen port of Aden for refueling. According to witnesses, at least two men were seen on board the smaller ship right before the explosion. The explosion created a 20 foot by 40 foot hole in the side of the ship. Seventeen US Naval personnel were killed and thirty-nine wounded in the attack. Investigations suggested that members of al-Qaeda, led by Osama Bin Laden, was behind the attack.	International	12-Oct-2000	12-Oct-2000	17
USA	September 11 Attacks	Hijacked American Airlines Flight 11 from Boston bound for Los Angeles, CA crashed into the north tower of the World Trade Center. Fifteen minutes later, hijacked United Airlines Flight 175 from Boston bound for Los Angeles, CA crashed into the south tower of the World Trade Center. Both towers collapsed, causing around 2,823 casualties and hundreds of injuries.	International	12-Sep-2001	11-Sep-2001	2749
Indonesia	Bali Bombings	Bali Bombings: In the 'worst act of terrorism' in Indonesia to date, 202 people were killed and 300 estimated injured when a car bomb went off in the entertainment district of Kuta Beach. Nearly three-quarters of the victims were foreigners.	International	13-Oct-2002	12-Oct-2002	202
Spain	Madrid Trains Bombing	Spain Trains: 191 people were killed and over 600 others injured when ten bombs detonated in four different locations on Madrid's train line.	International	11-Mar-2004	11-Mar-2004	191
Russia	School Hostages	Russian School Hostages: A group of thirty to thirty-five (sources varied) armed Chechen separatists, including men and women, many wearing suicide bomber belts, seized a school in the Southern Russian town of Belsan.	International	1-Sep-2004	1-Sep-2004	331

UK	London Metro Bombing	In the most violent day in London history since World War II, over fifty people were killed and about 700 injured in four suicide bomb blasts on public transportation. Three of the bombers struck the London underground train system, and the fourth detonated on a double-decker bus. The three train blasts occurred within moments of each other and the bus bombing happened about an hour after the first three.	International	7-Jul-2005	7-Jul-2005	27
Lebanon	Grapes of Wrath operation	A sixteen-day military blitz against Lebanon in 1996 in an attempt to end shelling of Northern Israel by Hezbollah. Israel conducted more than 1,100 air raids and extensive shelling. A UN installation was also hit by Israeli shelling causing the death of 118 Lebanese civilians. The conflict was de-escalated on 27 April by a ceasefire agreement banning attacks on civilians.	Regional	April 11, 1996	April 13, 1996	154 -170
Iraq	Iraq: Iraq War	War on Iraq	Regional	19-Mar-2003	19-Mar-2003	Unknown
Iraq	Iraq Bombing UN Headquarters in Baghdad	Iraq: A cement truck packed with explosives detonated outside the offices of the top United Nations envoy in Iraq, Sergio Vieira de Mello, killing him and twenty-one others, devastating the United Nation's headquarters in an unprecedented attack. Fifteen members of the UN's staff were killed in the attack and more than 150 individuals were injured. In the days after the attack, the United Nations announced that it was evacuating most of its 350 person staff from the country.	Regional	19-Aug-2003	19-Aug-2003	23
Iraq	Iraq: Police Department Bombings	Iraq: Suicide attackers detonated five simultaneous car bombs against police buildings during morning rush hour killing sixty-eight people and wounding up to 200 people. Five of the injured died overnight from their wounds bringing the death toll up to seventy-three. These are the largest attacks to hit Basra, a mainly Shite city, since the US-led occupation began one year ago.	Regional	21-Apr-2004	21-Apr-2004	73

Iraq	Iraq: Hayfa Street Bombing	Iraq: A car bomb exploded outside of the police station on Hayfa Street in Baghdad, where a crowd of volunteers and recruits were waiting to join the police force. Forty-seven people were killed and 114 wounded in the attack. The group headed by Abu Musab al-Zarquawi, Tawhid and Jihad (Tanzim Qa'idat Al-Jihad fi Bilad al-Rafidayn), claimed responsibility for the attack.	Regional	14-Sep-2004	14-Sep-2004	47
Lebanon	Assassination of PM Rafik Al-Hariri	On 14 February 2005 Hariri was killed, along with 21 others, when explosives equivalent of around 1,000 kg of TNT were detonated as his motorcade drove near the St. George Hotel in Beirut. Among the dead were several of Hariri's bodyguards and his friend and former Minister of the Economy Bassel Fleihan. Rafik Hariri was buried along with his body guards who died in the bombing at a mosque in downtown Beirut	Regional	15-Feb-2005	14-Feb-2005	22
Lebanon	Forced Resignation of PM Karami	Amid the growing pressure, Karami announced on February 28, 2005 that his government would resign, although it remained temporarily in a caretaker role. President Emile Lahoud re-appointed Karami as prime minister on March 10 and asked him to form a new government. On April 13, after failing to create a new Government, Karami resigned again. This resignation added to the turmoil already prevalent in Lebanon since Rafik Hariri's assassination as now there was no Government to call the elections which were due that upcoming March.	Regional	14-Apr-2005	13-Apr-2005	0
Iraq	Balad Bombing	Three suicide car bombers detonated their vehicles about 10 minutes apart in close proximity to each other in the Shiite town of Balad. Most of the dead were civilians. Casualty numbers for specific attacks were not given as the devices exploded so close together, in terms of time and location. All three blasts were claimed by the Al-Qaeda affiliated group, Tanzim Qa idat al-Jihad fi Bilad al-Rafidayn.	Regional	29-Sep-2005	29-Sep-2005	102

Iraq	Najaf Bombing	Iraq Najaf: 126 people were killed and 300 injured in a car bomb attack outside a mosque in Najaf just after prayers. Included in the fatalities was Supreme Council for the Islamic Revolution in Iraq leader Ayatollah Mohammed Baqr al-Hakim.	Regional	31-Aug-2003	29-Aug-2003	126
Lebanon	Assassination of Journalist Samir Qassir	The car of Samir Kassir, a journalist known for his opposition to Syrian involvement in Lebanon, was rigged with an explosive device placed under the driver's seat. The device detonated when he started the car outside his home, killing him. Samir Kassir, wrote for the Lebanese daily paper An Nahar. The attack occurred in a Christian neighborhood of Eastern Beirut.	Regional	2-Jun-2005	2-Jun-2005	1
Lebanon	Assassination of George Hawai	The former leader of the Lebanese Communist Party who has been a critic of Syria's power in Lebanon, George Hawi, was assassinated when a bomb that had been planted in his car exploded as he drove in Beirut. The one-pound bomb appears to have been detonated remotely and was planted under his seat. Hawi's driver, Thabet Bazzi, was slightly wounded in the attack. Opposition leaders blamed pro-Syrian forces for involvement in the attack.	Regional	21-Jun-2005	21-Jun-2005	1
Lebanon	Assassination Attempt on Journalist May Chidiac	Lebanon: LBC Chidiac A bomb detonated inside the vehicle of a prominent Lebanese journalist and political talk show host, May Chidiac, in the town of Jounieh, north of Beirut. The bomb detonated when Chidiac got in her car after having lunch at her friend.	Regional	26-Sep-2005	25-Sep-2005	0

Appendix D.   Abnormal Returns, Cumulative Average Abnormal Returns and Their Tests for the (0,10) Day Event Window

Dif	Domestic						Regional						International					
	AAR	Z1	Z2	CAAR	T1	T2	AAR	Z1	Z2	CAAR	T1	T2	AAR	Z1	Z2	CAAR	T1	T2
0	-0.24%	-4.86 ***	-5.40 ***	-0.24%	-4.86 ***	-4.77 ***	0.02%	0.34	0.62	0.02%	0.34	0.56	-0.47%	-8.43 ***	-7.96 ***	-0.47%	-8.43 ***	-7.66 ***
1	0.24%	3.16 ***	6.54 ***	0.00%	0.04	0.39	0.36%	5.65 ***	6.87 ***	0.38%	4.61 ***	3.50 ***	-0.48%	-5.26 ***	-8.40 ***	-0.94%	-8.88 ***	-7.53 ***
2	0.06%	0.81	1.45	0.07%	0.56	0.72	0.38%	3.70 ***	9.11 ***	0.76%	5.78 ***	5.49 ***	-0.67%	-6.69 ***	-11.34 ***	-1.61%	-11.05 ***	-8.74 ***
3	0.18%	3.59 ***	4.31 ***	0.25%	1.93 *	1.72 *	0.20%	3.83 ***	4.22 ***	0.96%	6.78 ***	6.18 ***	-0.25%	-4.01 ***	-4.36 ***	-1.86%	-11.74 ***	-9.40 ***
4	0.13%	2.74 ***	2.84 ***	0.38%	2.77 ***	2.27 **	0.16%	2.69 ***	3.19 ***	1.12%	7.29 ***	6.42 ***	0.24%	4.08 ***	4.44 ***	-1.63%	-9.62 ***	-7.93 ***
5	-0.17%	-3.56 ***	-4.04 ***	0.21%	1.46	1.29	0.36%	3.13 ***	8.58 ***	1.47%	7.72 ***	6.61 ***	-0.20%	-3.30 ***	-3.32 ***	-1.82%	-10.17 ***	-7.62 ***
6	0.11%	2.34 **	2.18 **	0.32%	2.09 **	1.71 *	-0.39%	-6.21 ***	-8.23 ***	1.08%	5.37 ***	4.62 ***	-0.15%	-2.20 **	-2.43 **	-1.98%	-10.27 ***	-7.39 ***
7	0.06%	1.15	1.44	0.38%	2.35 **	1.91 *	0.34%	6.87 ***	6.89 ***	1.42%	6.86 ***	5.65 ***	-0.31%	-4.36 ***	-5.68 ***	-2.28%	-11.14 ***	-7.75 ***
8	-0.07%	-1.20	-1.45	0.30%	1.76 *	1.50	0.46%	7.34 ***	9.40 ***	1.88%	8.69 ***	7.03 ***	0.10%	1.56	1.82 *	-2.18%	-10.15 ***	-7.20 ***
9	-0.04%	-0.61	-1.13	0.26%	1.43	1.18	-0.18%	-3.29 ***	-3.37 ***	1.70%	7.60 ***	6.15 ***	0.13%	2.24 **	2.61 ***	-2.05%	-9.25 ***	-6.49 ***
10	0.10%	0.91	3.55 ***	0.36%	1.69 *	1.71 *	0.15%	1.73 *	2.82 ***	1.85%	7.71 ***	6.13 ***	-0.02%	-0.34	-0.57	-2.07%	-9.04 ***	-6.28 ***

*   indicates test result is significant at the 90% level, ** at the 95% level, *** at the 99%

Appendix E.   Abnormal Returns, Cumulative Average Abnormal Returns and Tests for the (-10,10) Day Window

Dif	Domestic						Regional						International					
	AAR	Z1	Z2	CAAR	T1	T2	AAR	Z1	Z2	CAAR	T1	T2	AAR	Z1	Z2	CAAR	T1	T2
-10	0.10%	2.12 **	2.65 ***	0.10%	2.12 **	2.24 **	0.25%	4.31 ***	5.37 ***	0.25%	4.31 ***	3.50 ***	-0.19%	-3.81 ***	-3.58 ***	-0.19%	-3.81 ***	-3.52 ***
-9	0.29%	4.78 ***	6.87 ***	0.39%	5.06 ***	4.65 ***	0.05%	0.60	0.98	0.30%	2.81 ***	2.49 **	-0.07%	-1.27	-1.33	-0.26%	-3.49 ***	-2.99 ***
-8	0.10%	2.28 **	2.11 **	0.49%	5.53 ***	4.84 ***	0.04%	0.84	0.82	0.34%	2.89 ***	2.41 **	-0.08%	-1.52	-1.77 *	-0.34%	-3.71 ***	-3.03 ***
-7	-0.09%	-2.02 **	-2.00 **	0.40%	4.00 ***	3.48 ***	0.09%	1.04	1.02	0.44%	2.92 ***	2.11 **	0.07%	1.06	1.01	-0.27%	-2.32 **	-1.94 *
-6	-0.02%	-0.44	-0.84	0.38%	3.43 ***	2.70 ***	0.10%	0.94	3.58 ***	0.54%	2.94 ***	2.65 ***	-0.01%	-0.24	-0.40	-0.28%	-2.20 **	-1.82 *
-5	0.10%	2.00 **	2.09 **	0.48%	3.96 ***	2.96 ***	-0.14%	-2.46 **	-2.82 ***	0.40%	2.09 **	1.89 *	-0.18%	-2.77 ***	-3.80 ***	-0.46%	-3.22 ***	-2.46 **
-4	-0.02%	-0.56	-0.32	0.46%	3.55 ***	2.63 ***	-0.18%	-2.29 **	-3.91 ***	0.22%	1.07	1.00	0.12%	1.76 *	1.86 *	-0.34%	-2.19 **	-1.84 *
-3	-0.06%	-0.99	-1.30	0.40%	2.85 ***	2.08 **	0.06%	0.99	1.48	0.28%	1.30	1.22	0.16%	2.87 ***	3.75 ***	-0.18%	-1.10	-0.94
-2	-0.01%	-0.25	0.05	0.39%	2.64 ***	1.94 *	0.59%	11.01 ***	12.02 ***	0.86%	3.93 ***	3.33 ***	-0.11%	-2.15 **	-2.05 **	-0.29%	-1.66 *	-1.34
-1	-0.13%	-1.53	-2.87 ***	0.26%	1.50	1.26	-0.07%	-1.30	-0.84	0.80%	3.51 ***	3.06 ***	-0.27%	-3.68 ***	-5.71 ***	-0.56%	-2.95 ***	-2.34 **
0	-0.25%	-5.08 ***	-5.63 ***	0.01%	0.05	0.15	0.02%	0.43	0.69	0.82%	3.51 ***	3.04 ***	-0.44%	-8.62 ***	-8.36 ***	-1.00%	-5.12 ***	-3.71 ***
1	0.23%	3.02 ***	6.32 ***	0.24%	1.23	1.16	0.38%	5.79 ***	7.02 ***	1.19%	4.94 ***	3.92 ***	-0.49%	-5.88 ***	-9.64 ***	-1.49%	-7.00 ***	-5.04 ***
2	0.05%	0.66	1.27	0.29%	1.39	1.26	0.39%	3.76 ***	9.27 ***	1.58%	6.02 ***	5.04 ***	-0.62%	-6.88 ***	-11.76 ***	-2.11%	-9.14 ***	-6.49 ***
3	0.17%	3.42 ***	4.04 ***	0.47%	2.17 **	1.78 *	0.20%	3.92 ***	4.36 ***	1.79%	6.67 ***	5.47 ***	-0.21%	-3.56 ***	-3.93 ***	-2.32%	-9.74 ***	-6.88 ***
4	0.12%	2.53 **	2.52 **	0.59%	2.67 ***	2.08 **	0.17%	2.86 ***	3.44 ***	1.95%	7.12 ***	5.75 ***	0.21%	3.90 ***	4.40 ***	-2.10%	-8.63 ***	-6.14 ***
5	-0.18%	-3.82 ***	-4.37 ***	0.41%	1.80 *	1.45	0.37%	3.21 ***	8.63 ***	2.32%	7.81 ***	6.37 ***	-0.22%	-4.01 ***	-4.14 ***	-2.33%	-9.30 ***	-6.47 ***

Dif	Domestic						Regional						International					
	AAR	Z1	Z2	CAAR	T1	T2	AAR	Z1	Z2	CAAR	T1	T2	AAR	Z1	Z2	CAAR	T1	T2
6	0.09%	2.08 **	1.97 **	0.50%	2.18 **	1.68 *	-0.39%	-6.14 ***	-8.17 ***	1.93%	6.37 ***	5.22 ***	-0.20%	-3.11 ***	-3.65 ***	-2.52%	-9.78 ***	-6.86 ***
7	0.05%	0.99	1.25	0.55%	2.34 **	1.77 *	0.35%	6.99 ***	6.97 ***	2.28%	7.41 ***	5.91 ***	-0.33%	-5.19 ***	-6.76 ***	-2.86%	-10.74 ***	-7.54 ***
8	-0.09%	-1.40	-1.86 *	0.46%	1.91 *	1.47	0.47%	7.39 ***	9.55 ***	2.74%	8.74 ***	6.82 ***	0.06%	0.98	0.99	-2.80%	-10.27 ***	-7.36 ***
9	-0.05%	-0.80	-1.37	0.41%	1.63	1.23	-0.18%	-3.19 ***	-3.26 ***	2.57%	8.06 ***	6.30 ***	0.07%	1.29	1.54	-2.73%	-9.84 ***	-7.01 ***
10	0.09%	0.82	3.12 ***	0.50%	1.82 *	1.56	0.16%	1.86 *	3.10 ***	2.73%	8.26 ***	6.40 ***	-0.06%	-1.11	-1.17	-2.79%	-9.88 ***	-6.97 ***

* indicates test result is significant at the 90% level, ** at the 95% level, *** at the 99%

Appendix F. Table of End of Event Window CAAR and Test Values For Each Individual Event

Table 6. End of Event Window CAAR for International Events

| Event | Event Window | | | | | |
| | (-10 days, 10 days) | | | (0 days, 10 days) | | |
	CAAR	T1	T2	CAAR	T1	T2
Bali Bombings	1.70%	3.25 ***	1.08	0.11%	0.28	-0.22
Russia School Hostages	0.80%	1.41	1.61	1.78%	4.86 ***	3.89 ***
USS Cole Bombing	-0.10%	-0.26	1.11	0.18%	0.49	0.51
Apartments Bombings in Moscow	-0.70%	-1.06	-2.18 **	-0.24%	-0.58	-0.84
Bombing US Embassy in Kenya	-2.50%	-4.17 ***	-3.05 ***	-1.44%	-3.29 ***	-2.24 **
September 11th Attacks	-3.50%	-3.79 ***	-4.85 ***	-4.99%	-6.56 ***	-9.01 ***
Madrid Trains Bombing	-6.80%	-9.96 ***	-6.05 ***	-0.88%	-1.76 *	-1.67 *
London Metro Bombing	-10.90%	-8.8 ***	-3.04 ***	-10.93%	-11.92 ***	-2.07 **
All International	**-2.79%**	**-9.88 *****	**-6.97 *****	**-2.07%**	**-9.04 *****	**-6.28 *****

* indicates test result is significant at the 90% level, ** at the 95% level, *** at the 99% level.

Table 7. End of Event Window CAAR for Domestic Events

| Event | Event Window | | | | | |
| | (-10 days, 10 days) | | | (0 days, 10 days) | | |
	CAAR	T1	T2	CAAR	T1	T2
Shooting Rockets in Aqaba	5.44%	4.6 ***	3.11 ***	1.71%	1.79 *	0.94
Assassination of USAID employee	3.57%	6.86 ***	3.75 ***	2.22%	5.88 ***	4.7 ***
Assassination of Israeli Businessman	2.49%	3.17 ***	2.54 **	2.50%	3.72 ***	2.92 ***
Bombing Three Hotels	2.32%	2.19 **	1.81 *	-0.58%	-0.67	0.95
Bombing the Jordanian embassy in Baghdad	2.04%	1.29	0.48	0.18%	0.15	0.36
Shooting Israeli Embassy Guards	1.40%	2.46 **	0.32	0.61%	1.36	-0.22
Bomb at Security Personnel	-0.10%	-0.1	0.73	2.33%	3.25 ***	2.99 ***
Assassination Attempt on Israeli Diplomat	-1.90%	-3.7 ***	-0.59	-1.71%	-4.77 ***	-1.93 *

Event	CAAR	T1	T2	CAAR	T1	T2
Death of King Hussein	-1.98%	-2.9 ***	-1.93 *	0.40%	0.84	0.83
Shooting of Israeli Children	-2.25%	-4.18 ***	-3.53 ***	-0.66%	-1.52	-1.25
Burning Car of Intelligence Chief	-2.46%	-3.14 ***	-2.81 ***	-1.03%	-1.72 *	-1.99 **
Explosion at Intelligence Chief's House	-4.68%	-7.36 ***	-0.29	-1.70%	-3.83 ***	-2.64 ***
All Domestic	**0.50%**	**1.82 ***	**1.56**	**0.36%**	**1.69 ***	**1.71 ***

* indicates test result is significant at the 90% level, ** at the 95% level, *** at the 99% level.

Table 8.   End of Event Window CAAR for Regional Events

	Event Window					
	(-10 days, 10 days)			(0 days, 10 days)		
Event	CAAR	T1	T2	CAAR	T1	T2
Assassination of Journalist Samir Qassir	11.59%	9.01 ***	5.57 ***	5.93%	6.5 ***	4.48 ***
Najaf Bombings	6.46%	3.73 ***	3.18 ***	4.54%	3.64 ***	2.54 ***
Grapes of Wrath operation	4.85%	6.63 ***	3.7 ***	1.62%	3.04 ***	0.92
Lebanon: Assassination of George Hawai	3.82%	3.07 ***	2.31 **	0.73%	0.85	0.96
Iraq War	3.71%	5.92 ***	4.06 ***	3.05%	7.07 ***	6.11 ***
Iraq: Hayfa Street Bombing	2.78%	4.6 ***	4.55 ***	0.81%	2.25 **	1.93 *
Iraq: Bombing UN Headquarters in	1.89%	1.23	0.9	2.22%	1.84 *	2.01 **
Assassination of PM Rafik Al-Hariri	1.66%	1.46	1.31	3.70%	3.78 ***	3.1 ***
Iraq: Police Department bombings	0.28%	0.49	0.48	1.91%	4.17 ***	1.53
Forced Resignation of PM Karami	-0.14%	-0.11	0.76	-1.29%	-1.61	-1.06
Iraq: Balad Bombing	-0.83%	-0.85	-0.06	-0.78%	-1.15	-0.42
Lebanon: Assassination Attempt on journalist	-2.12%	-2.17 **	-0.78	-0.04%	-0.06	0.66
All Regional	**2.73%**	**8.26 ***	**6.40 ***	**1.85%**	**7.71 ***	**6.13 ***

* indicates test result is significant at the 90% level, ** at the 95% level, *** at the 99% level.

Appendix G.   Graph of CAAR Evolution Over Both Event Windows for Individual Events
CAAR for Individual Regional Events

(-10,10) Days	(0,10) Days
Iraq: Bombing UN Headquarters in Baghdad	**Iraq: Bombing UN Headquarters in Baghdad**
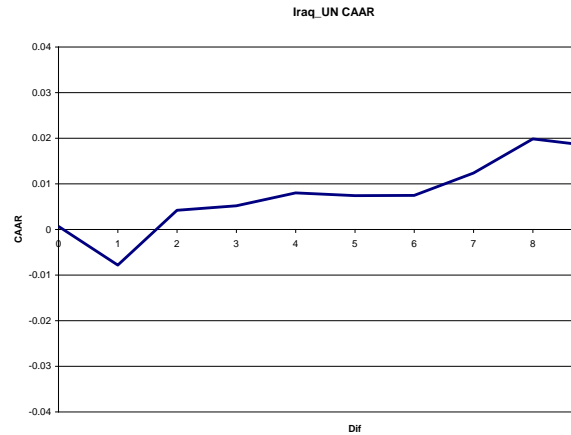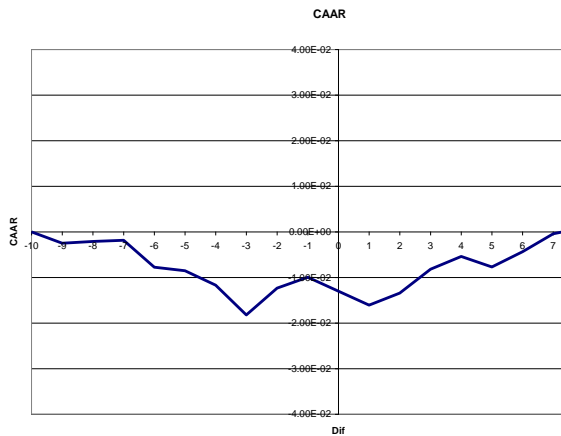
Iraq: Police Department Bombings   **Iraq: Police Department Bombings**
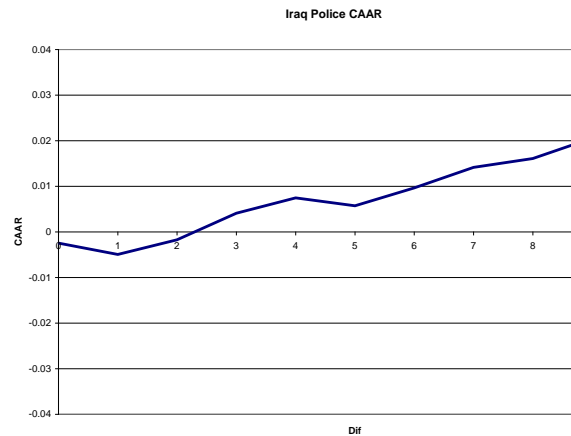
Iraq: Hayfa Street Bombing
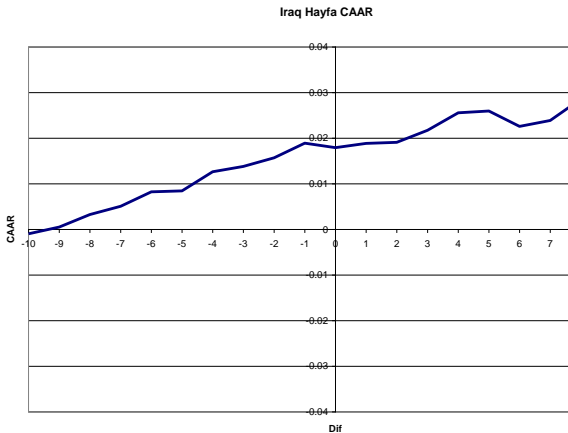
Iraq Hayfa CAAR

Iraq: Hayfa Street Bombing

CAAR

Iraq: Balad Bombing

Iraq Balad CAAR

Iraq: Balad Bombing

Iraq Balad CAAR

Lebanon: Grapes of Wrath Operation

CAAR
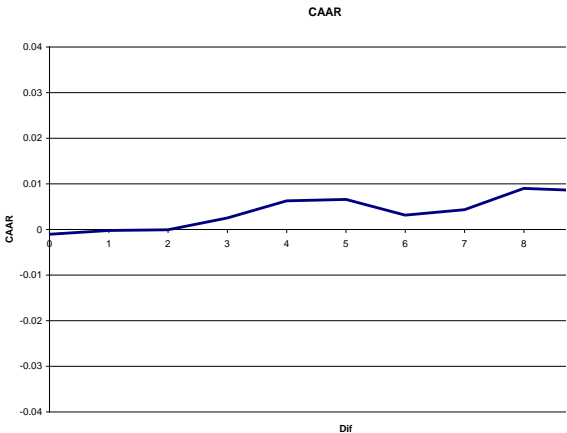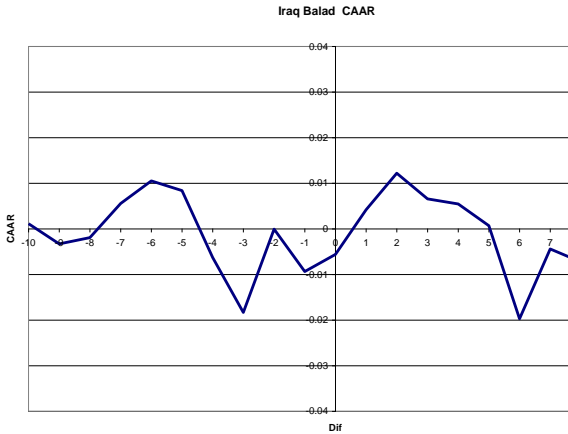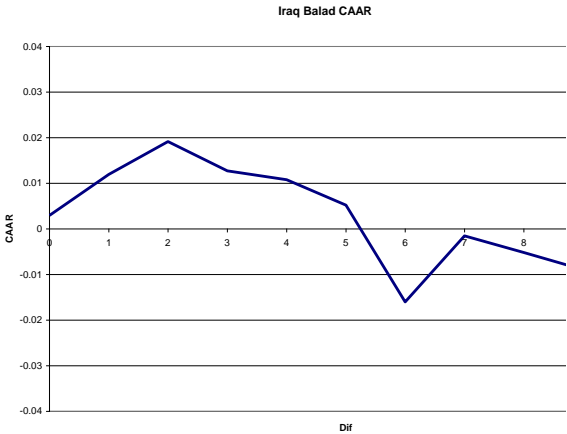
Lebanon: Grapes of Wrath Operation

Lebanon_Grapes_Wrath CAAR
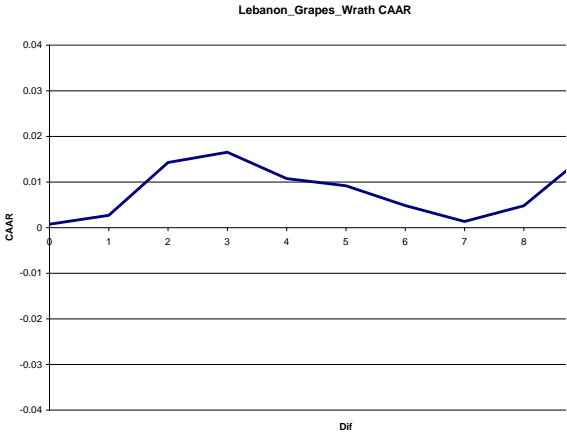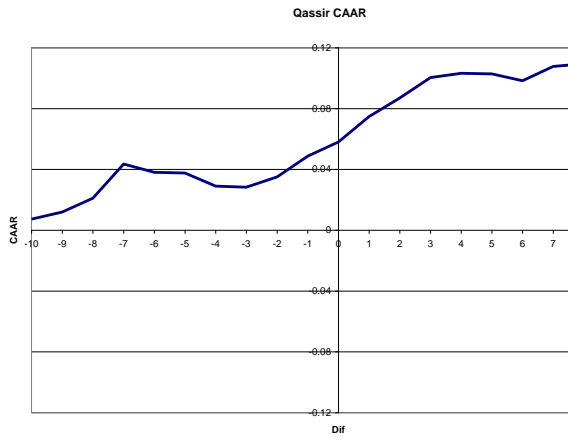
Lebanon: Assassination of Journalist Samir Qassir

Qassir CAAR

Lebanon: Assassination of Journalist Samir Qassir

CAAR

Iraq: Najaf Bombing

Najaf Minus CAAR

Iraq: Najaf Bombing

Najaf CAAR

Lebanon: Assassination Attempt on journalist May Chidiac

LBC_Chidiac_Minus CAAR

Lebanon: Assassination Attempt on journalist May Chidiac

LBC Chidiac CAAR

Lebanon: Forced Resignation of PM Karami

LBC Chidiac CAAR

Lebanon: Forced Resignation of PM Karami

CAAR

The Iraq War

CAAR

The Iraq War

Iraq_War CAAR

Lebanon: Assassination of George Hawai

CAAR

Lebanon: Assassination of George Hawai

Hawy CAAR

Lebanon: Assassination of PM Rafik Al-Hariri

CAAR

Dif

Lebanon: Assassination of PM Rafik Al-Hariri

Hariri CAAR

Dif
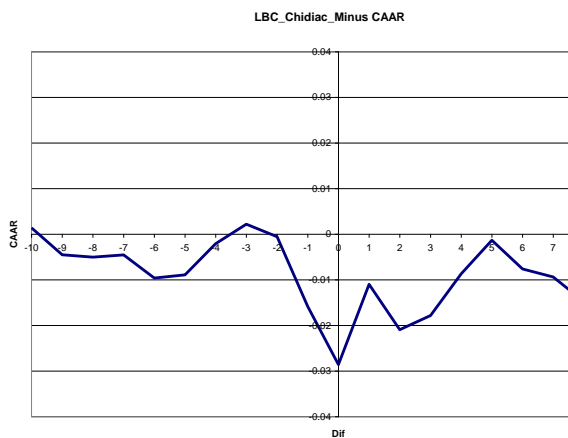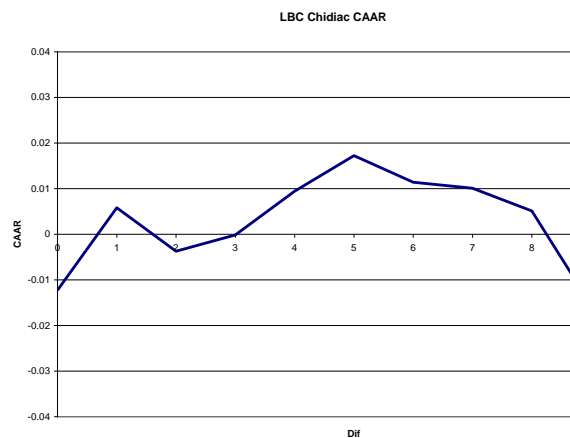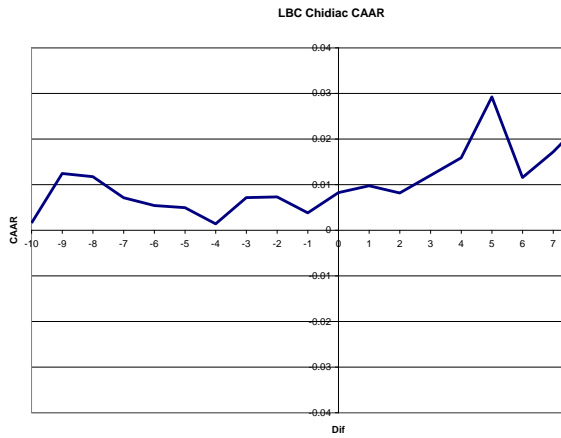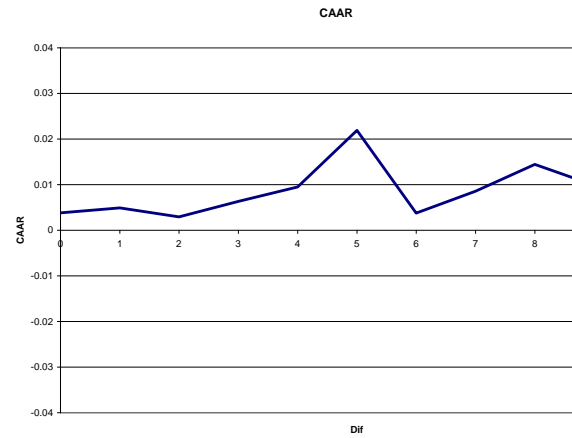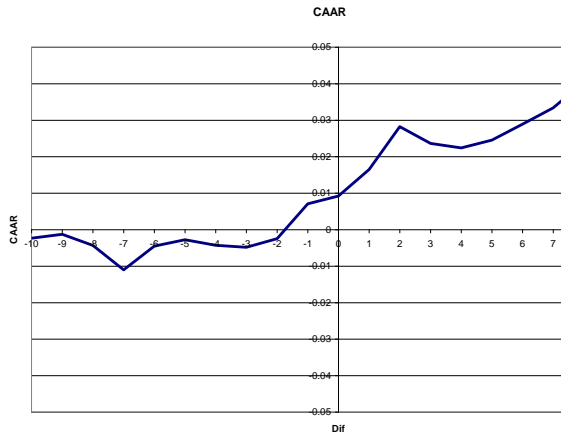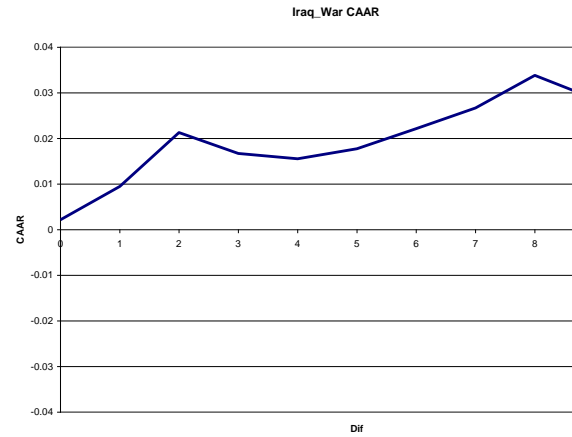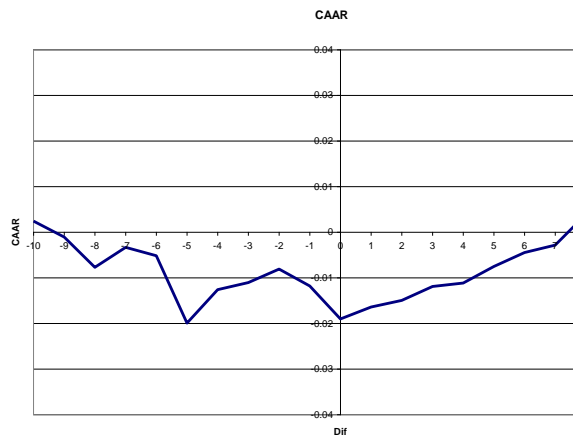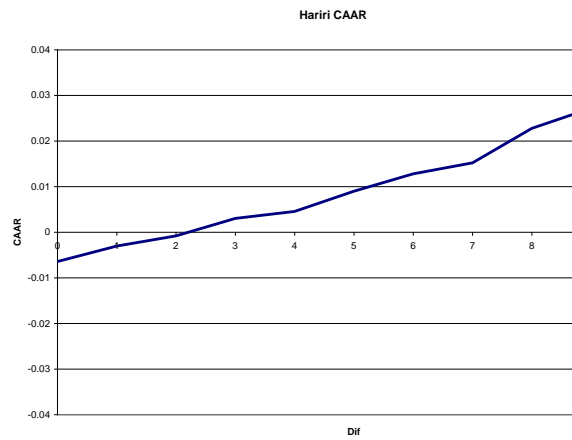
CAAR for Individual International Events

(-10,10) Days	(0,10) Days
USS Cole Bombing	**USS Cole Bombing**

USS COLE CAAR

USS Cole CAAR
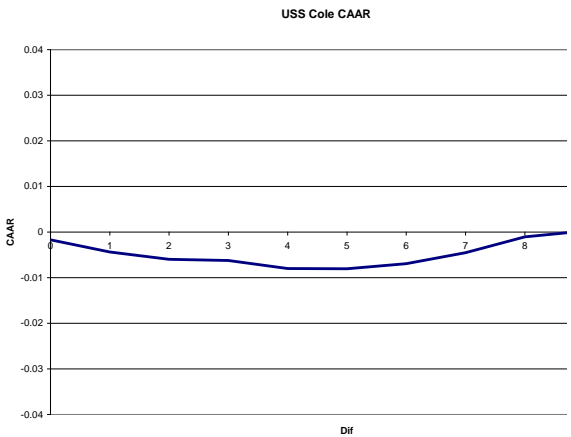
Bali Bombings

Bali Bombings

Bali CAAR

Bali CAAR
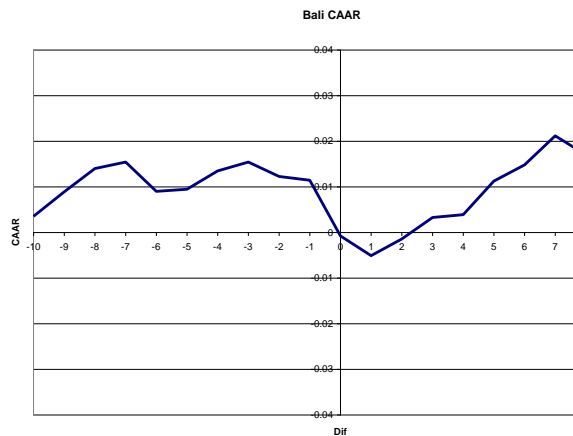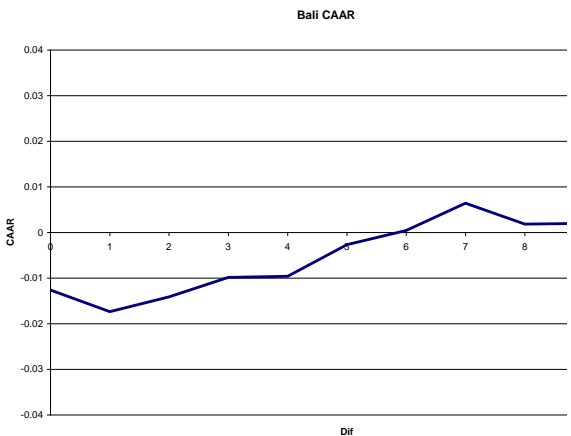
Bombing US Embassy in Kenya

Bombing US Embassy in Kenya

Kenya CAAR

Kenya CAAR
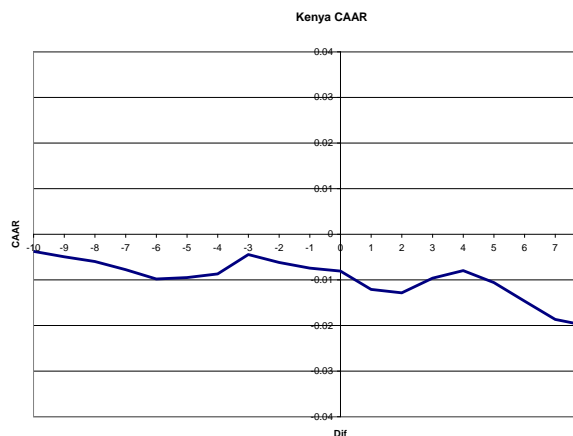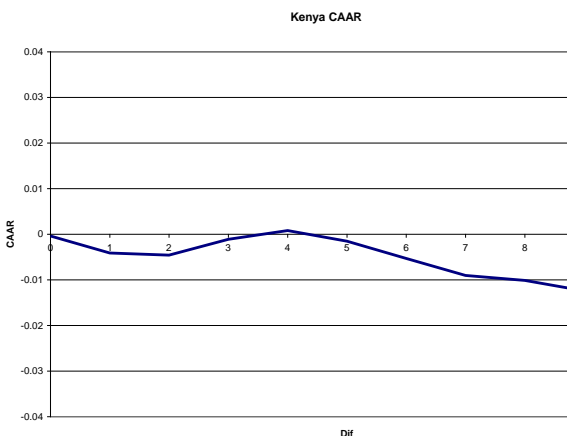
London Metro Bombing
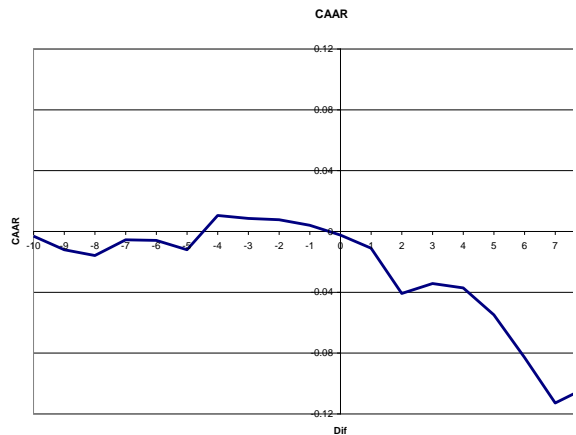
London Metro Bombing
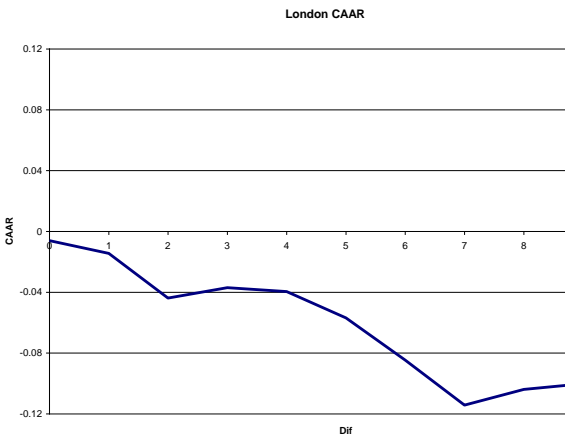
Madrid Trains Bombing
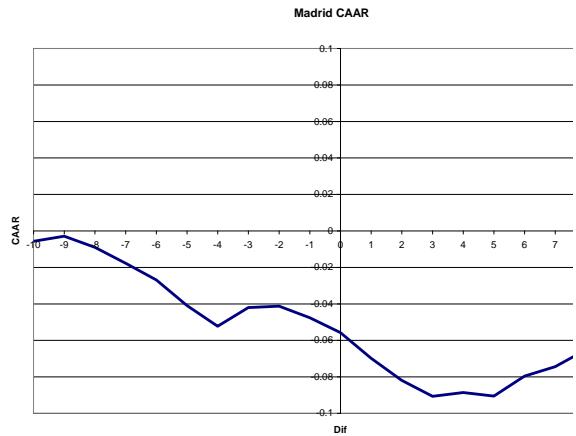
Madrid Trains Bombing
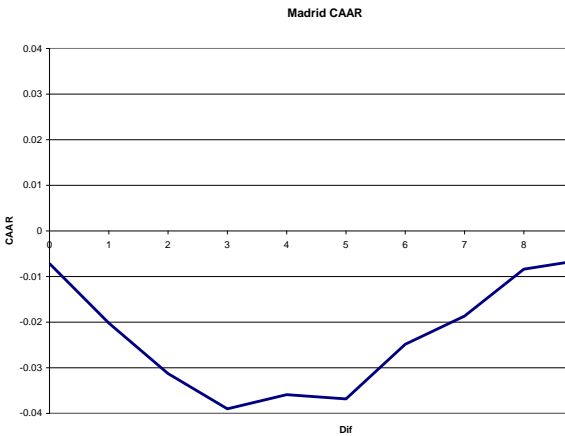
Apartments Bombing in Moscow
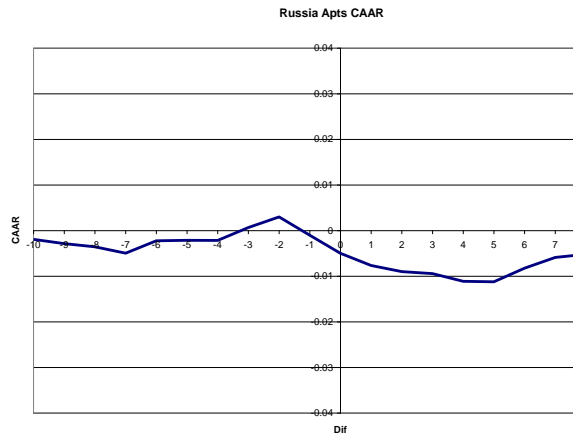
Apartments Bombing in Moscow
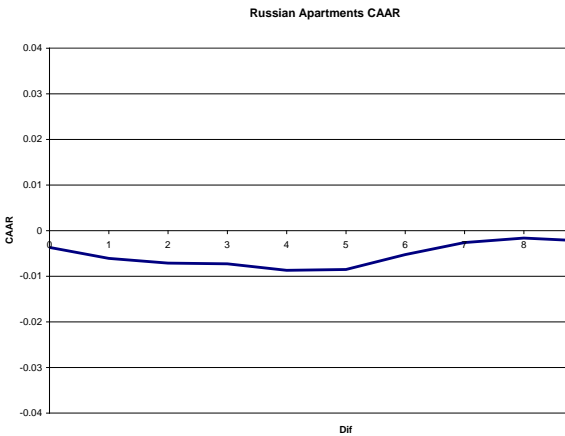
September 11th Attacks
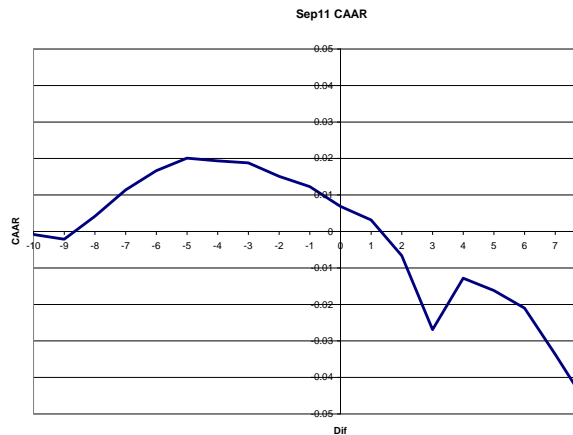
Sep11 CAAR

September 11th Attacks

Sep 11 CAAR

Russian School Hostages

Russia School CAAR

Russian School Hostages

Russia School CAAR
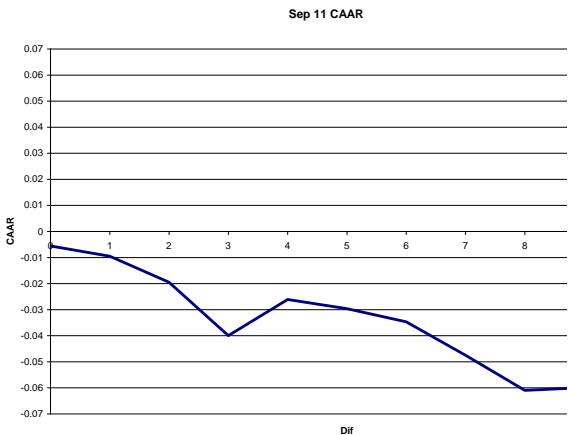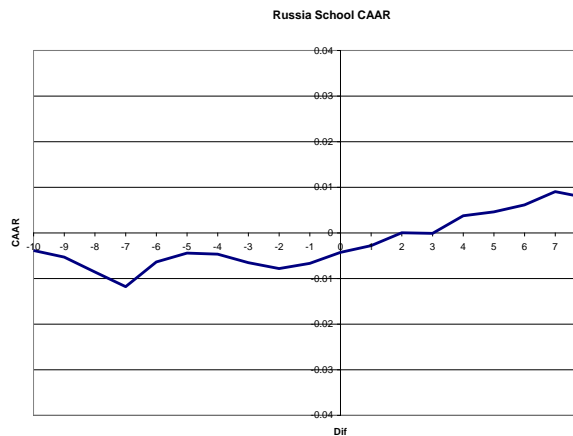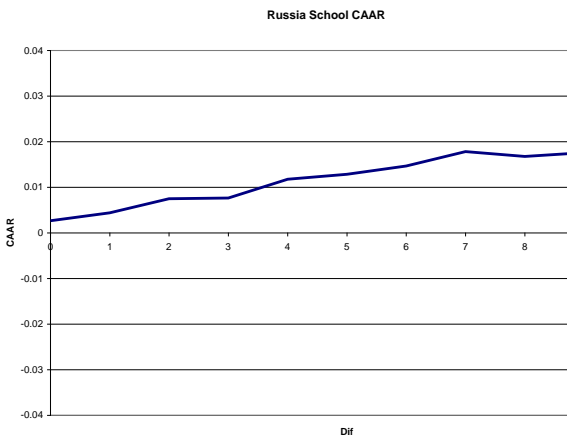
CAAR for Individual Domestic Events

(-10,10) Days   **(0,10) Days**

Explosion at Intelligence Chief's House

Mukabarat CAAR

Explosion at Intelligence Chief's House

Mukhabarat Bomb CAAR

Shooting Rockets in Aqaba

CAAR

Shooting Rockets in Aqaba

Aqaba CAAR

Bombing the Jordanian Embassy in Baghdad

Embassy Baghdad CAAR

Bombing the Jordanian Embassy in Baghdad

Embassy Baghdad CAAR

Assassination of USAID Employee

Foley CAAR

Assassination of USAID Employee

Foley CAAR

Bombing of Three Hotels

Hotel CAAR

Bombing of Three Hotels

Hotel CAAR

Death of King Hussein

Hussein Death CAAR

Death of King Hussein

Hussein Death CAAR

Assassination Attempt on Israeli Diplomat

Israeli Ratzabi CAAR

Assassination Attempt on Israeli Diplomat

Israeli Ratzabi CAAR

Assassination of Israeli Businessman

Israeli Snir CAAR

Assassination of Israeli Businessman

Israeli Snir CAAR

Bomb at Security Personnel

Syrian Jalal CAAR

Bomb at Security Personnel

Jordan Syria Jalal CAAR

Burning Car of Intelligence Chief

Kilani CAAR

Burning Car of Intelligence Chief

Kilani CAAR

Shooting Israeli Embassy Guards

Israeli Security CAAR

Shooting Israeli Embassy Guards

Jordan Israeli Security CAAR

Shooting Israeli Children

Jordan Daqamseh CAAR

Shooting Israeli Children

Jordan Daqamseh CAAR

Appendix H. Table of the Sectoral CAAR Over the (0,10) Event Window

Table 9. Banking Sector CAAR by Region

| Dif | Banking Sector | | | | | | | | | | | |
| | Domestic | | | | Regional | | | | International | | | |
	AAR	Z1	CAAR	T1	AAR	Z1	CAAR	T1	AAR	Z1	CAAR	T1
0	-0.44%	-2.70 ***	-0.44%	-2.70 ***	-0.41%	-2.23 **	-0.41%	-2.23 **	-0.55%	-2.72 ***	-0.55%	-2.72 ***
1	0.81%	1.30	0.37%	0.58	0.14%	0.78	-0.27%	-1.03	-0.97%	-3.33 ***	-1.52%	-4.29 ***
2	-0.33%	-0.94	0.04%	0.05	0.38%	2.65 ***	0.11%	0.36	-0.96%	-3.96 ***	-2.48%	-5.77 ***
3	0.62%	3.04 ***	0.66%	0.86	0.42%	2.21 **	0.53%	1.49	-0.27%	-1.31	-2.75%	-5.78 ***
4	0.07%	0.42	0.73%	0.93	0.32%	2.00 **	0.85%	2.19 **	0.49%	2.83 ***	-2.26%	-4.47 ***
5	-0.22%	-1.41	0.52%	0.64	0.47%	2.90 ***	1.31%	3.13 ***	-0.35%	-1.76 *	-2.61%	-4.81 ***
6	0.13%	0.90	0.64%	0.79	-1.17%	-5.89 ***	0.15%	0.32	-0.38%	-1.69 *	-2.99%	-5.09 ***
7	0.15%	1.20	0.79%	0.96	0.32%	1.78 *	0.47%	0.94	-0.90%	-3.94 ***	-3.89%	-6.17 ***
8	-0.22%	-1.47	0.58%	0.69	0.75%	3.90 ***	1.22%	2.28 **	-0.34%	-1.44	-4.23%	-6.28 ***
9	-0.13%	-0.72	0.45%	0.52	-0.48%	-2.97 ***	0.74%	1.33	0.00%	0.00	-4.23%	-6.12 ***
10	-0.23%	-2.13 **	0.22%	0.26	0.04%	0.18	0.78%	1.29	0.21%	1.22	-4.02%	-5.66 ***

*   indicates test result is significant at the 90% level, ** at the 95% level, *** at the 99% level.

Table 10. Industrial Sector CAAR by Region

| Dif | Industrial Sector | | | | | | | | | | | |
| | Domestic | | | | Regional | | | | International | | | |
	AAR	Z1	CAAR	T1	AAR	Z1	CAAR	T1	AAR	Z1	CAAR	T1
0	-0.23%	-3.63 ***	-0.23%	-3.63 ***	0.06%	0.76	0.06%	0.76	-0.65%	-8.17 ***	-0.65%	-8.17 ***
1	0.13%	1.84 *	-0.10%	-1.10	0.32%	4.54 ***	0.38%	3.73 ***	-0.41%	-2.42 **	-1.06%	-5.65 ***
2	0.12%	1.02	0.01%	0.08	0.32%	3.50 ***	0.70%	5.11 ***	-0.57%	-3.00 ***	-1.63%	-6.11 ***
3	0.17%	2.16 **	0.18%	1.07	0.17%	2.25 **	0.87%	5.57 ***	-0.28%	-2.81 ***	-1.91%	-6.71 ***
4	0.21%	2.96 ***	0.39%	2.15 **	0.19%	2.03 **	1.06%	5.82 ***	0.28%	3.03 ***	-1.63%	-5.42 ***
5	-0.16%	-2.55 **	0.22%	1.17	0.38%	1.66 *	1.44%	4.91 ***	-0.09%	-0.97	-1.72%	-5.47 ***
6	0.17%	2.38 **	0.39%	1.91 *	-0.26%	-3.22 ***	1.17%	3.86 ***	0.00%	0.02	-1.71%	-5.21 ***
7	-0.02%	-0.20	0.37%	1.66 *	0.27%	3.65 ***	1.44%	4.61 ***	-0.08%	-0.77	-1.79%	-5.20 ***
8	-0.15%	-2.37 **	0.22%	0.93	0.33%	3.07 ***	1.77%	5.36 ***	0.17%	1.72 *	-1.62%	-4.51 ***
9	-0.01%	-0.15	0.21%	0.86	-0.10%	-1.23	1.67%	4.89 ***	0.19%	2.28 **	-1.43%	-3.88 ***
10	-0.02%	-0.25	0.19%	0.77	0.14%	1.42	1.81%	5.10 ***	0.15%	1.86 *	-1.28%	-3.38 ***

*   indicates test result is significant at the 90% level, ** at the 95% level, *** at the 99% level.

Table 11. Services Sector CAAR by Region

	Services Sector											
	Domestic				Regional				International			
Dif	AAR	Z1	CAAR	T1	AAR	Z1	CAAR	T1	AAR	Z1	CAAR	T1
0	-0.36%	-3.14 ***	-0.36%	-3.14 ***	0.11%	1.18	0.11%	1.18	-0.42%	-3.53 ***	-0.42%	-3.53 ***
1	0.26%	2.72 ***	-0.10%	-0.69	0.52%	3.36 ***	0.64%	3.48 ***	-0.54%	-4.71 ***	-0.96%	-5.82 ***
2	0.19%	1.96 **	0.09%	0.49	0.59%	2.07 **	1.23%	3.62 ***	-0.97%	-6.95 ***	-1.93%	-8.92 ***
3	0.11%	1.19	0.20%	1.00	0.26%	2.62 ***	1.49%	4.22 ***	-0.24%	-2.03 **	-2.17%	-8.80 ***
4	0.10%	1.05	0.30%	1.36	0.17%	1.55	1.66%	4.49 ***	0.12%	1.02	-2.06%	-7.53 ***
5	-0.17%	-1.55	0.13%	0.52	0.35%	3.72 ***	2.01%	5.26 ***	-0.32%	-2.74 ***	-2.38%	-8.00 ***
6	0.05%	0.53	0.18%	0.67	-0.32%	-2.65 ***	1.68%	4.21 ***	-0.41%	-2.67 ***	-2.79%	-8.33 ***
7	0.11%	1.33	0.29%	1.04	0.62%	6.81 ***	2.31%	5.62 ***	-0.62%	-4.25 ***	-3.41%	-9.34 ***
8	-0.04%	-0.23	0.25%	0.74	0.62%	6.68 ***	2.92%	6.95 ***	0.14%	1.13	-3.27%	-8.47 ***
9	-0.17%	-0.85	0.08%	0.19	-0.29%	-2.55 **	2.64%	6.06 ***	0.12%	1.11	-3.14%	-7.83 ***
10	0.50%	1.31	0.57%	1.05	0.36%	1.73 *	2.99%	6.22 ***	-0.25%	-1.99 **	-3.39%	-8.07 ***

*   indicates test result is significant at the 90% level, ** at the 95% level, *** at the 99% level.

Table 12. Insurance Sector CAAR by Region

	Insurance Sector											
	Domestic				Regional				International			
Dif	AAR	Z1	CAAR	T1	AAR	Z1	CAAR	T1	AAR	Z1	CAAR	T1
0	0.07%	0.74	0.07%	0.74	-0.01%	-0.10	-0.01%	-0.10	0.01%	0.14	0.01%	0.14
1	0.19%	2.09 **	0.27%	1.96 *	0.28%	2.29 **	0.27%	1.47	-0.25%	-2.29 **	-0.24%	-1.74 *
2	-0.06%	-0.27	0.21%	0.83	0.11%	0.95	0.38%	1.75 *	-0.24%	-2.10 **	-0.48%	-2.68 ***
3	0.08%	0.87	0.29%	1.07	0.02%	0.17	0.40%	1.62	-0.16%	-1.65 *	-0.65%	-3.15 ***
4	-0.01%	-0.11	0.28%	0.97	-0.06%	-0.58	0.33%	1.24	0.17%	2.27 **	-0.47%	-2.17 **
5	-0.15%	-1.65 *	0.13%	0.43	0.25%	0.79	0.59%	1.39	-0.19%	-1.75 *	-0.66%	-2.72 ***
6	0.01%	0.14	0.14%	0.45	-0.41%	-2.21 **	0.18%	0.39	0.01%	0.08	-0.66%	-2.45 **
7	0.15%	1.79 *	0.29%	0.91	-0.04%	-0.35	0.14%	0.30	-0.04%	-0.31	-0.69%	-2.37 **
8	0.19%	1.97 **	0.49%	1.45	0.33%	1.93 *	0.47%	0.93	0.09%	0.76	-0.61%	-1.94 *
9	0.14%	1.68 *	0.63%	1.81 *	-0.01%	-0.05	0.46%	0.90	0.02%	0.13	-0.59%	-1.74 *
10	-0.03%	-0.32	0.60%	1.68 *	-0.17%	-0.83	0.29%	0.54	-0.23%	-2.09 **	-0.82%	-2.30 **

*   indicates test result is significant at the 90% level, ** at the 95% level, *** at the 99% level.

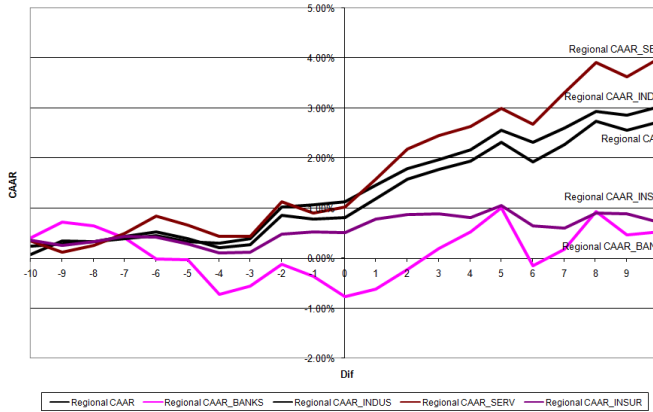## Appendix I. Graph of the Average CAAR of Each Region By Sector

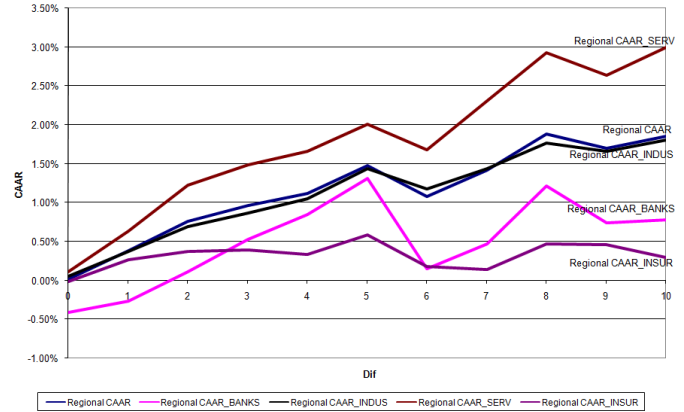### Average CAAR of Each Region By Sector

(-10, 10) Days   **(0, 10) Days**
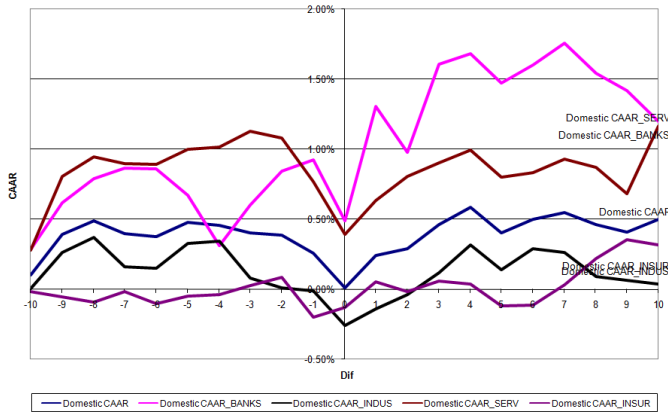
Regional

Domestic

International