

# How did the French and Belgian Equity Markets React to their Domestic Terrorist Attacks?

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## Abstract

This paper investigates the effects of domestic terrorist attacks on the stocks listed on French and Belgian stock exchanges. We use two asset pricing models (CAPM and Fama-French Five-Factor Model) to assess how abnormal returns have changed following the attacks. We also estimate short-term and long-term changes in systematic risk around the attacks. Our findings show that the French sectors experienced mixed reactions following the Charlie Hebdo attack and were moderately affected by other terrorist attacks (Paris and Nice). Furthermore, the results indicate that Belgian sectors were sensitive to Brussels terrorist attack in terms of both risk and return.

**Keywords:** Terrorist attack; Abnormal return; Systematic risk; Equity market

## Introduction

Terrorism has, more recently, become a global issue with an alarming escalation in the frequency of terrorist attacks. This has led to an increase in academics investigating the financial implications of terrorist attacks on stock market returns. For instance, using event study methodology, Ramiah and Graham [1], find that domestic terrorism in Indonesia can have a large impact on the risk and returns of the equity market. This impact is found to be greater than international terrorist events such as September 11 in the United States. We adopt a similar approach to separately examine the impacts of the Charlie Hebdo (occurred on 7 January 2015), Paris (13 November 2015) and Nice (15 July 2016) attacks in France in addition to the Brussels attack (22 March 2016) in Belgium on their respective equity markets. Our research provides empirical evidence of terrorist attacks on French and Belgian stock market returns and documents a guide for making investment decisions in the event of another terrorist attack.

## Literature Review

The literature suggests that equity holders do not always react negatively to international terrorist activities and may become insensitive to them. Ramiah et al. [2], for instance, find that the Australian stock market was strongly affected by the September 11 attacks in the US, but was not significantly affected by subsequent attacks on Madrid, London and Bali. Graham and Ramiah [3] explain that this is due to investors having already incorporated geopolitical terrorist risk in their expectations. Later studies find similar effects in other markets such as Japan [3], Malaysia [4], Indonesia [1] and Singapore [5]. In the European context, one strand of literature supports the negative effect of terrorist events on stock markets [6] while another strand shows evidence of the positive impact of terrorist events on the stock market [7]. Chen and Siems [8] and Richman et al. [9] document the short term effect of September 11 on the global equity markets whilst other studies show that terrorist attacks tend to have sector-by-sector differences. For instance, Cam [10] shows that food, tobacco and real estate industries were affected by the September 11 attacks.

These studies show that equity markets can react differently to terrorist activities depending on where the attacks occur and the variability in risk and return can differ significantly across the sectors. The current literature indicates a lack of empirical evidence on the

effects of terrorist attacks on the French and Belgian markets, hence our paper attempts to fill this gap.

## Data and Methodology

We use the French and Belgian daily stock return indexes, the CAC40 and BEL20, respectively, as market proxies and three-month treasury bills as risk-free rates. The data, obtained from Datastream, are from January 2013 to July 2016 and consists 1201 French stocks and 159 Belgian stocks. These stocks are categorised into 40 sectors for France and 33 sectors for Belgium using GICS.

We follow the event study methodology of Brown and Warner [11] by calculating logarithmic daily returns for each stock, then adjust for the daily returns using two asset pricing models to obtain ex-post abnormal returns (AR). If the terrorist attack occurs during normal market trading hours, AR is calculated for the same trading date. Otherwise, AR is calculated from the next available trading day from the event date.

We start by calculating AR using the CAPM,

$$AR = R_{it} - \left( \beta_{it}^0 + \beta_{it}^1 (R_{mt} - R_{ft}) \right)$$

Where  $R_{it}$  is the stock return,  $R_{mt}$  is the market return,  $R_{ft}$  is the risk-free rate and  $\beta_{it}^0$  and  $\beta_{it}^1$  are the estimated parameters from a rolling CAPM over a period of previous 260 trading days.

The second model is the Fama-French Five-Factor Model (FF5FM) where the AR is estimated as follows:

$$AR = R_{it} - \left( \beta_{it}^0 + \beta_{it}^1 (R_{mt} - R_{ft}) + \beta_{it}^2 (SMB_t) + \beta_{it}^3 (HML_t) + \beta_{it}^4 (RMW_t) + \beta_{it}^5 (CMA_t) \right)$$

Where  $SMB_t$  is the size factor,  $HML_t$  is the book-to-market factor,  $RMW_t$  is the profitability factor,  $CMA_t$  is the investment factor,  $\beta_{it}^0$  is

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the sum of risk-free rate and the intercept  $\alpha$  and  $\beta_{it1}^1, \beta_{it1}^2, \beta_{it1}^3, \beta_{it1}^4$  and  $\beta_{it1}^5$  are the coefficients of  $R_{mt} - R_{fp}, SMB_p, HML_p, RMW_t$  and  $CMA_t$  respectively.

As there may be delayed responses when traders overreact or underreact to news of a terrorist event, we estimate the cumulative abnormal return (CAR) over five (CAR5), ten (CAR10) and fifteen (CAR15) days. To control for firm-specific news, we exclude companies that issue firm-specific information 15 days on either side of the terrorist event dates from the sectors. Firm-specific information is defined as any company press releases on the Euronext exchange.

To determine whether systematic risk of the French and Belgian sectors change, we follow the approach of Ramiah et al. [2] by fitting a multiplicative dummy variable into the CAPM to capture the change in risk following a terrorist attack. The dummy variable takes a value of one on the first trading day after the event and zero otherwise. We also calculate the long-term effects of these terrorist attacks on systematic risk using a multiplicative structural dummy variable, which takes a value of zero prior to each terrorist attack and one after the event.

### Empirical Results

In general, our results show that French stock market reacts negatively on the first trading day following the French attacks while no statistically significant AR is observed on the Belgian stock market after the Brussel attacks (Table 1). We also observe that the French stock market tend not to experience any delayed reactions while Belgian stock market exhibits positive CAR5 and CAR10 from the event dates.

### France

Table 2 displays statistically significant reactions (in %) from the French stock market following the attacks. Following the Paris attack, the results indicate that only the fixed line telecommunications industry experienced a statistically significant negative abnormal return of -2.95% (CAPM) and -4.04% (FF5FM) on the next trading day following the event with a negligible difference between the two models. This result is mainly driven by firm-specific news as the effects dissipates after controlling for firm-specific information.

When assessing delayed reactions, we find the mining industry exhibits a negative CAR5 of -10.58% (CAPM) and -8.85% (FF5FM) and CAR10 of -14.12% (CAPM) and -9.59% (FF5FM) from the event date. These results remain statistically significant even after controlling for firm-specific information (Table 3).

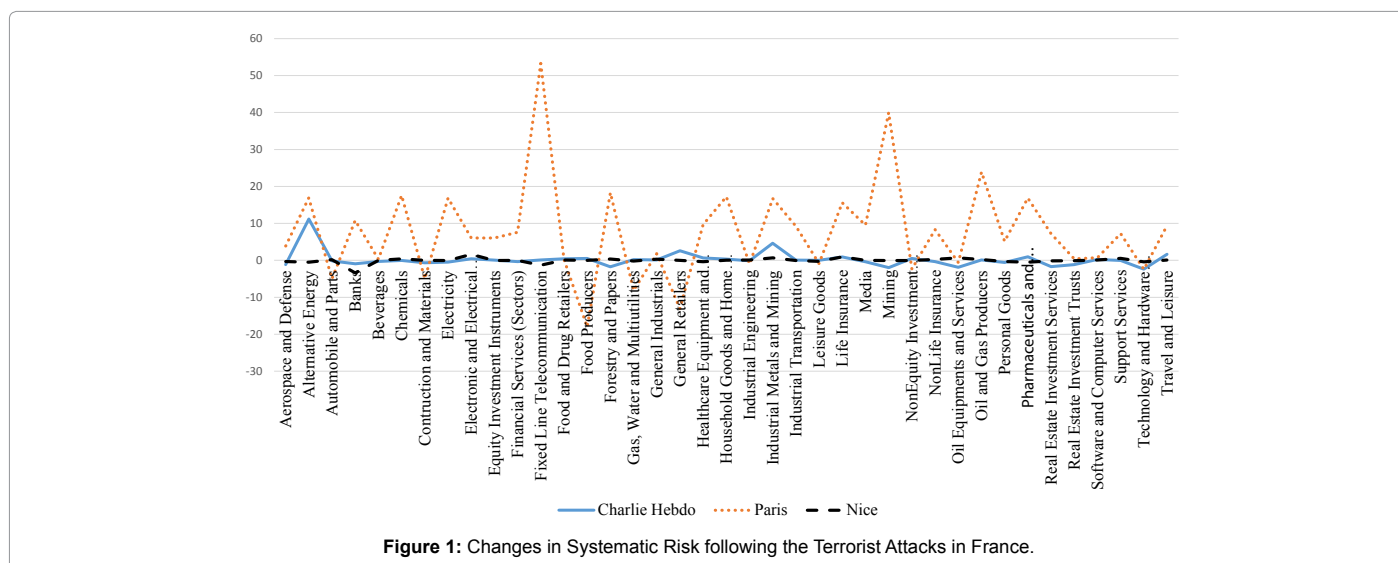
We find most French sectors to be sensitive to the Paris attack and relatively less so to the Charlie Hebdo and Nice terrorist events. Following the efficient market hypothesis (EMH), it is reasonable to hypothesise that returns will fall as a result of an increase in systematic risk following a terrorist attack. Following the Paris attack, we document an increase in short-term systematic risk in 28 sectors with the mining and fixed line telecommunications sectors experiencing the highest increase of 37.22 and 56.04 respectively (Figure 1). Based on Figure 1, indicating the change in long-term systematic risk, we conclude that the Paris terrorist attack did not influence the long-term risk structure.

### Belgium

Statistically significant sectoral reactions (in %) following the

Country	Date/Event	CAPM				FF5FM			
		AR	CAR5	CAR10	CAR15	AR	CAR5	CAR10	CAR15
France	Charlie Hebdo	-0.01	0.11	-0.69	-0.93	0.34	2.2	2.59	3.39
		(-0.08)	-0.27	(-1.67)	(-1.29)	-2.41	-5.53	-5.87	-4.33
	Paris	-0.44	-0.37	-0.49	-0.11	-0.4	0.54	0.64	-0.11
		(-3.76)	(-1.05)	(-1.00)	(-0.27)	(-3.66)	-1.59	-1.55	(-0.27)
Nice	0.17	0.71	N/A	N/A	N/A	N/A	N/A	N/A	
	(-0.99)	-2.1	N/A	N/A	N/A	N/A	N/A	N/A	
Belgium	22-03-2016	-0.21	0.73	2	6.21	-0.07	0.34	1.51	3.78
		(-1.66)	-2.18	-3.12	-1.57	(-0.42)	-0.46	-1.17	-1.08

Table 1: Market Reaction following the Terrorist Attacks (t-stat in parenthesis).



Sector	CAPM				FF5FM	
	AR	CAR5	CAR10	CAR15	CAR10	CAR15
<b>France – Charlie Hebdo</b>						
Alternative Energy	0.38	-1.27	-1.7	-22.2	2.05	-19.5
	-0.23	(-0.35)	(-0.36)	(-4.08)	-0.42	(-3.46)
Automobiles and Parts	-0.39	0.93	0.3	2.53	7.14	12.07
	(-0.36)	-0.4	-0.1	-0.7	-1.66	-2.46
Beverages	-0.02	0.01	0.65	1.4	3.06	4.51
	(-0.03)	-0.01	-0.38	-0.71	-1.62	-2.2
Financial Services	-0.26	-1.09	-3.79	-3.31	-1.43	0.23
	(-0.45)	(-0.92)	(-2.46)	(-1.75)	(-0.88)	-0.12
Gas, Water and Multi-utilities	0.03	1.07	-0.47	3.95	2.71	8.26
	-0.03	-0.52	(-0.17)	-1.13	-0.92	-2.36
General Retailers	1.85	0.17	-1.18	-2.17	0	-0.67
	-2.12	-0.09	(-0.47)	(-0.77)	0	(-0.20)
Industrial Metals and Mining	3.14	11.33	7.21	1.89	9.77	4.84
	-1.77	-2.98	-1.36	-0.31	-1.63	-0.68
Life Insurance	0.56	-0.12	0.02	0.15	7.05	10.02
	-0.64	(-0.08)	-0.01	-0.06	-1.85	-2.36
Media	-0.11	1.13	1.8	2.67	3.62	5.01
	(-0.19)	-0.9	-1.11	-1.45	-1.88	-2.2
Non-equity Investment Instruments	0.41	0.19	-0.27	0.2	3.6	5.42
	-1.98	-0.45	(-0.50)	-0.3	-2.16	-2.89
Personal Goods	-0.37	-4.17	-7.12	-8.47	-1.66	-2.39
	(-0.45)	(-2.47)	(-3.08)	(-3.05)	(-0.68)	(-0.87)
Real Estate Investment and Services	-1.26	0.53	0.42	5.75	3.3	10.06
	(-1.53)	-0.33	-0.19	-2.04	-1.32	-3.17
Real Estate Investment Trusts	-0.89	1.03	1.72	2.85	3.37	4.86
	(-1.43)	-0.81	-0.93	-1.26	-1.74	-2.07
<b>France – Paris</b>						
Fixed Line Telecommunications	-2.95	-2.52	-6.5	-4.4	-5.88	-4.86
	(-2.17)	(-0.95)	(-1.69)	(-0.98)	(-1.46)	(-1.02)
Mining	-2.52	-10.58	-14.12	-7.13	-9.59	-3.16
	(-1.66)	(-3.07)	(-2.75)	(-1.16)	(-1.96)	(-0.55)
Non-equity Investment Instruments	0.13	1.34	0.96	0.94	1.3	-0.79
	-0.44	-2.09	-1.17	-0.9	-0.64	(-0.38)
<b>France - Nice</b>						
Financial Services	4.36	2.32	N/A	N/A	N/A	N/A
	-5.62	-1.35	N/A	N/A	N/A	N/A
Fixed Line Telecommunications	2.4	5.72	N/A	N/A	N/A	N/A
	-1.59	-1.99	N/A	N/A	N/A	N/A
Software and Computer Services	0.25	2.87	N/A	N/A	N/A	N/A
	-0.46	-2.37	N/A	N/A	N/A	N/A

**Table 2:** Significant Sectoral Reactions following the Terrorist Attacks (t-stat in parenthesis).

terrorist attack in Belgium are shown in Table 2. Surprisingly, we find no statistically significant reactions on the first trading day following the attack. A plausible explanation is that the market had already anticipated the possibility of a terrorist attack due to the imposition of a security lock down on Brussels by the Belgian government. This lockdown was imposed founded on information received indicating that the city was a staging area for the terrorists responsible for the Paris attacks on 21 November 2015 with the Belgian government warning of a “serious and imminent” possibility of a Paris-style attack in Belgium.

However, we find evidence of a delayed response to the attack in the aerospace and defence, beverages, electricity and real estate investment

Sector	CAPM				FF5FM	
	AR	CAR5	CAR10	CAR15	CAR10	CAR15
<b>France – Charlie Hebdo</b>						
Alternative Energy	1.16	4.43	5.53	-0.24	6.74	1.41
	-0.72	-1.48	-1.27	(-0.05)	-1.62	-0.29
Automobiles and Parts	-0.54	0.36	-0.74	0.16	6.81	10.61
	(-0.55)	-0.15	(-0.23)	-0.04	-1.43	-1.87
Beverages	-0.01	-0.17	0.3	1.22	2.58	4.16
	(-0.02)	(-0.11)	-0.14	-0.47	-1.17	-1.66
Financial Services	-0.26	0.07	-4.38	-4.53	-2.36	-1.4
	(-0.33)	-0.04	(-2.02)	(-1.70)	(-1.00)	(-0.49)
Gas, Water and Multiutilities	0	0.71	-0.94	6.1	-0.09	7.16
	0	-0.24	(-0.25)	-1.31	(-0.02)	-1.67
General Retailers	3.81	-0.14	-0.3	-2.38	-1.14	-4.03
	-2.34	(-0.04)	(-0.07)	(-0.50)	(-0.24)	(-0.76)
Industrial Metals and Mining	-0.99	24.16	18.17	14.39	22.62	18.69
	(-0.28)	-3.24	-1.86	-1.29	-2.12	-1.5
Life Insurance	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A
Media	-0.01	1.7	1.96	2.62	2.12	2.59
	(-0.01)	-1.06	-1.01	-1.28	-0.9	-0.95
Non-equity Investment Instruments	0.41	0.19	-0.27	0.2	3.6	5.42
	-1.98	-0.45	(-0.50)	-0.3	-2.16	-2.89
Personal Goods	-0.36	-6.41	-12.25	-13.65	-6.1	-7.28
	(-0.28)	(-2.40)	(-3.46)	(-3.30)	(-1.58)	(-1.71)
Real Estate Investment and Services	-1.88	2.16	2.09	9.59	4.79	13.31
	(-1.53)	-0.94	-0.64	-2.28	-1.43	-3.04
Real Estate Investment Trusts	-0.14	2.11	4.72	6.36	5.23	6.53
	(-0.06)	-0.44	-0.73	-0.87	-0.77	-0.84
<b>France - Paris</b>						
Fixed Line Telecommunications	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A
Mining	-4.08	-16.08	-21.87	-11.86	-16.95	-3.39
	(-1.68)	(-2.84)	(-2.60)	(-1.17)	(-1.91)	(-0.34)
Non-equity Investment Instruments	0.13	1.34	0.96	0.94	1.3	-0.79
	-0.44	-2.09	-1.17	-0.9	-0.64	(-0.38)
<b>France - Nice</b>						
Financial Services	7.24	4.21	N/A	N/A	N/A	N/A
	-5.94	-1.54	N/A	N/A	N/A	N/A
Fixed Line Telecommunications	3.82	8.57	N/A	N/A	N/A	N/A
	-1.6	-1.92	N/A	N/A	N/A	N/A
Software and Computer Services	0.13	2.97	N/A	N/A	N/A	N/A
	-0.15	(-1.57)	N/A	N/A	N/A	N/A
<b>Belgium - 22 March 2016</b>						
Aerospace and Defense	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A
Beverages	-0.31	-1.13	15.14	22.54	15.78	19.26
	(-0.17)	(-0.29)	-2.8	-3.55	-3.05	-3.36
Electricity	0.71	4.72	8.63	189.45	40.11	153.47
	-0.05	-0.14	-0.18	-3.24	-0.96	-3.11
Real Estate Investment and Services	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A

**Table 3:** Significant Sectoral Reactions Excluding Firm-Specific Information (t-stat in parenthesis).

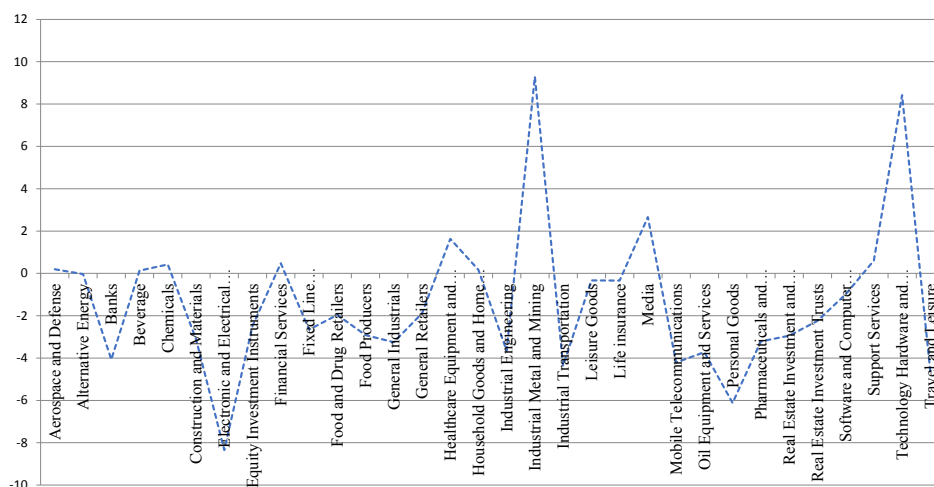


Figure 2: Changes in Systematic Risks following the Terrorist Attack in Belgium.

and services sectors. The electricity sector shows an exceptionally high positive CAR15 of 126.86% (CAPM) and 103.50% (FF5FM). The highly unusual CAR15 is caused by a company, 4Energy, in this sector which experiences a surge of 2300% in stock price rather than being affected by the terrorist attack.

The beverage sector also exhibits statistically significant positive CAR10 of 6.83% (CAPM) and 6.88% (FF5FM) and CAR15 of 8.14% (CAPM) and 7.22% (FF5FM) following the terrorist event. We propose that the positive results are due to an increase in demand for basic needs following extreme events such as this terrorist attack. Furthermore, we document the difference in CAR10 between the two models is insignificant.

Figure 2 displays the changes in systematic risks of the sectors following the terrorist attacks in Belgium. We exclude the electricity sector from our analysis because of the issue with 4Energy (as mentioned above). Surprisingly, ten sectors exhibit an increase in short-term systematic risk whereas 22 sectors experience a decrease in short-term systematic risk. In addition, we find 23 out of 33 sectors experience a decrease in long-term systematic risk. A plausible explanation is that investors have taken the terrorist risk into account in their investment portfolios appraisal.

## Conclusion

Overall, our findings suggest that (1) the French terrorist attacks affect the French equity market immediately while the Brussels terrorist attack produced delayed reactions in securities listed on the Belgian stock exchange, (2) Belgian market sectors were relatively less sensitive to their domestic terrorist attack and (3) terrorist attacks do not always lead to an increase in both short-term and long-term systematic risk.

## References

- Ramiah V, Graham M (2013) The impact of domestic and international terrorism on equity markets: Evidence from Indonesia. *International Journal of Accounting & Information Management* 21: 91-107.
- Ramiah V, Cam M, Calabro M, Maher D, Ghafouri S (2010) Changes in Equity Returns and Volatility across Different Australian Industries Following the Recent Terrorist Attacks. *Pacific-Basin Finance Journal* 18: 64-76.
- Graham M, Ramiah V (2012) Global Terrorism and Adaptive Expectations in Financial Markets: Evidence from Japanese Equity Market. *Research in International Business and Finance* 26: 97-119.

- Ramiah V (2012) The Impact of International Terrorist Attacks on the Risk and Return of Malaysian Equity Portfolios. *Review of Pacific Basin Financial Markets and Policies* 15: 145-171.
- Ramiah V, Hui CWC (2015) Industry Effects of Recent Terrorist Attacks: Evidence from Singapore. *Terrorism and the economy: Impacts on the capital market and the global tourism industry*. Eleven International Publishing, Hague, Netherlands, pp: 41-76.
- Barros CP, Gil-Alana LA (2009) Stock Market Returns and Terrorist Violence: Evidence from the Basque Country. *Applied Economics Letters* 16: 1575-1579.
- Apergis E, Apergis N (2016) The impact of 11/13 Paris terrorist attacks on stock prices: Evidence from the international defence industry. *Applied Economics Letters* pp: 45-48.
- Chen AH, Siems TF (2004) The effects of terrorism on global capital markets. *European Journal of Political Economy* 20: 349-366.
- Richman V, Santos MR, Barkoulas JT (2005) Short- and Long-Term effects of the 9/11 Event: The International Evidence. *International Journal of Theoretical and Applied Finance* 8: 947-958.
- Cam M (2008) The Impact of Terrorism on United States Industries. *Economic Papers* 27: 115-135.
- Brown SJ, Warner JB (1985) Using daily stock returns: the case of event studies. *Journal of Financial Economics* 14: 3-31.