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The effects of terrorism and war on the oil price–stock index relationship

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ABSTRACT

The effects war and terrorism have on the covariance between oil prices and the indices of four major stock markets – the American S&P500, the European DAX, CAC40 and FTSE100 – using non-linear BEKK–GARCH type models are investigated. The findings indicate that the covariance between stock and oil returns is affected by war. A tentative explanation is that the two wars examined here predispose investors and market agents for more profound and longer lasting effects on global markets. On the other hand, terrorist incidents that are one-off unanticipated security shocks, only the co-movement between CAC40, DAX and oil returns is affected and no significant impact is observed in the relationship between the S&P500, FTSE100 and oil returns. This difference in the reaction may tentatively be interpreted as indicating that the latter are more efficient in absorbing the impact of terrorist attacks.

1. Introduction

In an increasingly integrated world economy, globalised markets echo and reverberate major political events such as for instance political news and elections; coups; civil strife and popular uprisings; intra- and inter-state conflict and war; and mega terrorist attacks. As many studies have shown, more often than not, the impact of such events is not confined to the sphere of politics but spreads to the economy with potentially significant direct and indirect effects on economic activity that, depending on the type of the event, can either be short lived or longer lasting (inter alia: Abadie and Gardeazabal, 2008; Crain and Crain, 2006; Blomberg and Hess, 2009; Eckstein and Tsiddon, 2004; Enders et al., 2006; Jong-A-Pin, 2009). Among other economic effects, they can bring about noteworthy changes and shifts in equity markets; in the cross country correlation of assets; in portfolio allocation and diversification and affect investor sentiment (inter alia: Amihud and Wohl, 2004; Asteriou and Siriopoulos, 2003; Blomberg et al., 2009; Arin et al., 2008; Drakos, 2010; Frey and Kucher, 2000, 2001; Guidolin and La Ferrara, 2010; Kollias et al., 2010; Nikkinen and Vahamaa, 2010; Schneider and Troeger, 2006).

In line with previous studies that have addressed markets' reaction to major political events, this paper examines how major international security shocks, in particular terrorism and war, have affected the volatility of stock and oil price returns and their covariance. To the best of our knowledge this is an issue that has not been addressed before in the relevant finance literature that examines the dynamics that govern the relationship between oil prices and stock markets. Energy and equity markets can be shaken by profound geopolitical changes and major security episodes. So can their association. Thus, the paper hopes to shed light on how and to what extent this relationship is affected by exogenous geopolitical and security shocks and, given the nature of the events studied here, provide useful information concerning time-varying risk premium. To this end, non-linear BEKK–GARCH type models are used to examine the covariance between oil prices and four major international stock market indices: the American S&P500 and the Europeans DAX, CAC and FTSE100 covering a time period that includes major international terrorist incidents such as the 1988 Pan Am bombing, 9/11, the Madrid 2004 and London 2005 bomb attacks as well as the first and second Iraqi wars.

Undoubtedly, such momentous events were of global importance, having shaped and determined the course of modern history. Hence, it is of interest to know how the markets in question have reacted to one-off events such as a terrorist attack vis-à-vis events of longer duration and of greater geopolitical importance with longer lasting effects in terms of their outcome such as the two wars in Iraq and the eventual toppling of Saddam Hussein's regime. Also of interest is to examine whether any noteworthy differences in the reaction of European and US markets can be established with the concomitant inferences for portfolio allocation and diversification. The rest of the paper is structured as follows. Section two is an epigrammatic literature review of the relationship between oil and stock prices as well as the impact security

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shocks such as terrorism and war have on global markets. The empirical methodology employed is briefly presented in section three, while in section four the empirical findings are presented and discussed. Finally, section five concludes the paper.

2. An epigrammatic literature review

A growing literature addresses the relationship between stock markets and oil prices (inter alia: Apergis and Miller, 2009; Filis et al., 2011; Miller and Ratti, 2009; Mohanty et al., 2011; Park and Ratti, 2008; Zhu et al., 2011). In it, two predominant strands can be broadly identified. On a theoretical level of argumentation, the relationship between these two markets can either be negative or positive. On the one hand, increases in oil prices invariably lead to higher transportation, production, and heating costs, which can put a drag on corporate earnings. In addition, higher oil prices affect inflation expectations and curtail consumers' discretionary spending. As a consequence, inflationary pressures may lead to upward pressures on interest rates and through this channel affect economic activity and stock price valuations. On the other hand, however, investors may very well associate increasing oil prices with a booming economy. Thus, higher oil prices could reflect stronger business performance with the concomitant impact on stock markets.

Not surprisingly, the empirical evidence, that a growing number of papers have yielded, is mixed and does not seem to offer an unequivocal and universally applicable support in either direction. On the one hand, a significant number of papers report empirical findings in favour of a negative relation between these two markets and variables (inter alia: Ciner, 2001; O'Neill et al., 2008; Papapetrou, 2001; Sadorsky, 1999). For instance, Nandha and Faff (2008), studying the short term link between oil prices and thirty-five mainstream global industries, report findings of oil prices having a negative impact on all of them with the exception of the oil and gas industries. Similar different effects of oil prices to different stock sectors are also reported by Arouri and Nguyen (2010), suggesting that the introduction of an oil asset into a stock portfolio can have significant diversification benefits. The findings reported by Park and Ratti (2008) show that increases in oil prices have a negative impact on stock returns in the US and twelve European countries. This however, is not the case for the stock market in Norway, an oil exporting country. Perhaps not surprisingly the results show a positive reaction to rises in the oil price. Inconclusive are also the findings reported by Jones and Kaul (1996). They indicate a negative relationship between stock and oil markets in the case of the USA and Canada but they are inconclusive for Japan and UK.

On the other hand, Huang et al. (1996), using an unrestricted vector autoregressive model (VAR), find no evidence of a relationship between oil prices and the S&P500 market index. Similar findings are also reported in an earlier paper by Chen et al. (1986). In a recent study, Apergis and Miller (2009) examine whether structural oil-market shocks affect stock returns in eight developed countries reporting no significant responses of international stock market returns.

Given this division and conflicting findings, a number of recent studies have argued that the relationship between oil and stock prices is not stable over time. For instance, Mohanty et al. (2010), using the Central and Eastern European countries as the vehicle of their empirical investigation, argue that even if there is no significant association between oil prices and the stock returns over the whole of their sample period (1998–2010), the sub-period analysis reveals that this relationship does vary across firms and over time. Miller and Ratti (2009), using a cointegration methodology that allows for endogenously identified structural breaks, report findings suggesting that the expected negative long run relationship appears to disintegrate after September of 1999. They attribute this result to the possible presence of several stock market and/or oil price bubbles since the turn of the century. Broadly similar findings are presented by Jammazi and Aloui (2010), arguing that the negative relationship appears to be more pronounced during the pre-1999 period. Finally, the findings of Alpanta and Peralta-Alva (2010) offer evidence in favour of the argument that the increase in energy prices was indeed an important contributor to the stock market crash of 1973–1974.

Thus, given this background of evidence on the relationship between oil prices and stock markets, it would be interesting to include in the *equation* of their association the effects of major political events and episodes such as the two Iraqi wars and mega terrorist attacks such as 9/11 or the more recent Madrid and London bomb attacks. As already pointed out, there is ample evidence indicating that socio-political events in general and war, armed conflict and terrorism in particular, often exert considerable influence on markets' behaviour albeit the extent, duration and depth of the latter's reaction may vary significantly depending, among others, on the attributes of the specific event (inter allia: Amihud and Wohl, 2004; Drakos, 2010; Frey and Kucher, 2000, 2001; Guidolin and La Ferrara, 2010; Enders et al., 2011; Kollias et al., 2010, 2011, 2013; Eldor and Melnick, 2004; Schneider and Troeger, 2006). As Bialkowski et al. (2008) note, markets can be unsettled by important political events and changes due to the risk and uncertainty they may potentially represent. From their perspective, major political developments, such as terrorism and war, represent external events that can directly affect market risk premia and investors' sentiment highly increasing volatility and thus exert an adverse impact on asset valuation, investment decisions and portfolio allocation. Given the global nature of financial markets, an increase in the risk emanating from the actions of a government or non-governmental actor, such as a terrorist organisation, can bring about noteworthy changes and shifts in markets, in the cross country correlation of assets, in portfolio allocation and diversification. Furthermore, as political events, for instance an armed conflict or war, unfold; market agents will adjust their position depending on the anticipated result of the conflict as this is determined by various incidents during the military operations that can affect the course and the final outcome of the fighting. For instance, Frey and Kucher (2000, 2001) and Choudhry (2010) report such evidence in the case of World War II. Results by Amihud and Wohl (2004) also show that markets, during the second Gulf War, adjusted their behaviour to the probability of Saddam's fall from power and hence the final outcome of the war.

Obviously this is not the case when it comes to terrorist incidents since, although as a threat they are omnipresent, they are nevertheless unanticipated when they take place. Sandler et al. (1983) define terrorism as “premeditated, threatened or actual use of force or violence to attain a political goal through fear, coercion, or intimidation”. As, among others, Caruso and Schneider (2011, 2013) and Shughart (2006) observe, this definition of terrorism incorporates all the predominant and defining characteristics of terrorism: use (or threat) of violence for political purposes; organised and intended actions that are not constrained by any rules or conventions aiming to widely spread fear and uncertainty. Given that terrorist attacks are events that cannot be anticipated, they act as exogenous sudden shocks to markets with the potential to rattle and unsettle them. Furthermore, unlike armed conflict and wars, terrorist attacks are concentrated in time and space whereas the former are appreciably more prolonged and invariably exhibit preparation and escalation/de-escalation phases as they unfold. In contrast, terrorist incidents are one-day[1] events although their repercussions may last longer especially the fear, anxiety, insecurity and uncertainty they generate. Among other determinants, the duration of these effects depends upon the severity of the attack. As Enders and Sandler (2000) show, the increase in religiously-motivated/supreme-value terrorism has brought about a reduction in the number of terrorist incidents, but has increased the severity and the violence of the attacks

[1] The obvious exception to this general rule being hostage situations by terrorists.