The war on terror and its impact on the long-term volatility of financial markets ☆

Viviana Fernandez *

Center for Applied Economics (CEA) of the Department of Industrial Engineering at the University of Chile, Chile

Abstract

In this article, we analyze how the U.S.' declaration of the war on terror and the subsequent invasion of Iraq has impacted long-term volatility of stock markets around the world. In doing so, we utilize two statistical techniques: wavelet-based variance analysis and a semi-parametric fractional autoregressive (SEMIFARIMA) model. Our sample comprises stock and commodity indices worldwide for the sample period January 2000–June 2006. Specifically, we consider four geographic regions: the Americas, Africa/ Middle East, Europe, and Asia/Pacific. We conclude that political instability in the Middle East had its greatest impact on the volatility of financial markets around the beginning of the Iraq war, and it mostly hit developed markets (e.g., United States, United Kingdom, and Japan). Thereafter, for most sampled indices, volatility has exhibited a decreasing trend to reach eventually levels even lower than that observed at the beginning of our sample. An exception is Egypt's CMA and the Dow Jones AIG all commodities. We think that the latest political conflicts in the Middle East and their impact on the price of oil may be the most likely driving force of such volatility in those two indices. Specifically, among Egypt's main export products are petroleum and petroleum products.
© 2006 Elsevier Inc. All rights reserved.

 * Postal address: Avenida Republica 701, Santiago, Chile. Tel.: +56 2 978 4047; fax: +56 2 689 7895.
     E-mail address: vfernand@dii.uchile.cl.

1. Introduction

Measuring volatility of financial returns has been the center of attention of several studies in the past two decades (see, for instance, the survey article by Poon & Granger, 2003). Within this literature, a subject that has become particularly relevant in light of recent worldwide events is the long-term effect of political instability on the fluctuations of stock markets. In particular, capturing permanent volatility shifts has been the focus of recent studies, which have concentrated on the Asian crisis and 9/11, among other themes.

For instance, Hammoudeh and Li (2008) examine sudden changes in volatility for five Gulf area Arab stock markets by means of Inclan and Tiao (1994)'s iterative cumulative sum of squares (ICSS) algorithm,[1] and analyze their impacts on the estimated persistence of volatility. Their study finds that most Gulf Arab stock markets are more sensitive to major global events than to local and regional factors. The 1997 Asian crisis, the collapse of oil prices in 1998 after the crisis, the adoption of the price band mechanism by OPEC in 2000, and the 9/11 attack are found to have consistently affected the Gulf markets. Fernandez (2006a) in turn analyzes whether the Asian crisis and the terrorist attacks of 9/11 caused permanent volatility shifts in the stock markets around the globe. She focuses on eight MSCI stock indices that comprise developed and emerging economies, and test for the presence of volatility breakpoints by the ICSS algorithm and wavelet-variance analysis. Her estimation results show that the number of shifts detected by the two methods decreases considerably by filtering out the data for both conditional heteroskedasticity and serial correlation. In particular, for filtered returns, the ICSS algorithm fails to find any volatility shifts over 1997–2002, whereas wavelet analysis finds evidence of volatility breakpoints at the lower scales of the data (i.e., short-term dynamics). Moreover, she concludes that there were no dramatic changes in the magnitude of the standard deviation of filtered returns at different time scales and across the sample period.

An advantage of wavelet-variance analysis over the ICSS algorithm is that it makes it possible to detect variance shifts across different time scales. That is, it enables us to distinguish between variance shifts at the high- and low-frequency components of the data (i.e., short- and long-term dynamics, respectively). Wavelets have been applied in several studies of the fields of economics and finance from the mid-1990's onwards. Early studies in this area are Ramsey, Usikov, and Zaslavsky (1995) and Ramsey and Zhang (1996, 1997), which concentrate on stock markets and foreign exchange rate dynamics. More recent contributions have dealt with the permanent income hypothesis, the relation between futures and spot prices, the estimation of systematic risk of an asset in the context of the domestic and international version of the capital asset pricing model (CAPM), seasonality filtering of time series, time and scale dependency of intraday Asian spot exchange rates, heterogeneous trading in commodity markets, structural breakpoints in volatility and wavelet-based computation of value at risk, among other themes (e.g., Connor & Rossiter, 2005; Fernandez, 2005, 2006b; Fernandez & Lucey, 2007; Gençay, Whitcher, & Selcuk, 2001, 2003, 2005; In & Kim, 2006; Karuppiah & Los, 2005; Lin & Stevenson, 2001; Ramsey & Lampart, 1998; Whitcher, 2004). Two survey articles on the use of wavelets in economics and finance are provided by Ramsey (1999, 2002).

The focus of this article is to study whether long-term (i.e., unconditional) volatility of worldwide stock markets has undergone permanent shifts due to the current political instability in the Middle East, primarily caused by the invasion of Iraq and the ongoing Israeli–Palestinian conflict. To that end, we resort to wavelet-variance analysis and to a semi-parametric version of a

---

[1] One of the first applications of this algorithm to financial markets was Aggarwal, Inclan, and Leal (1999).