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September 11 and time-varying beta of United States companies

Taufiq Choudhry

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Abstract

The tragic events of 11 September 2001 in the USA is said to have adversely affected the global economy and the financial markets around the world. This paper empirically investigates the effects of the terrorist attacks and the period after on the time-varying beta (risk) of a few companies in the USA. Daily data from 1991 to 2002 and the bivariate MA-GARCH model are applied to create the time-varying betas for the firms. Results indicate that September 11 events and the period after affected most of the US companies under investigation. The size and direction of the effect varies according to the firms. All companies did not experience an increase in their beta.

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Notes

[1] A detailed discussion of these factors is provided by Rosenberg and Guy (1976a, 1976b).

[2] Rosenberg and Ohlson (1976), Fabozzi and Francis (1978), and Bos and Newbold (1984) provide evidence that security betas are not only time-varying but can also be better described by some form of stochastic model. According to Lin et al. (1992) the stochastic structure of the beta has important implications for the measures of capital asset pricing and performance, efficient market hypothesis and in forecasting the stock returns.

[3] See Markowitz (1952), Sharpe (1964) and Lintner (1965) for details of the CAPM.

[4] According to Klemkosky and Martin (1975) betas will be time-varying if excess returns are characterized by conditional heteroscedasticity.

[5] Hansen and Richard (1987) have shown that omission of conditioning information, as is done in tests of constant beta versions of the CAPM, can lead to erroneous conclusions regarding the conditional mean variance efficiency of a portfolio.

[6] The profiles of the firms are obtained from the website of Corporate Information.

[7] According to Engle and Kroner (1995) multivariate GARCH models are useful in multivariate finance and economic models, which require the modelling of both variance and covariance.

[8] In the bivariate GARCH(1,1) system, the diagonal vech parameterization involves nine conditional variance parameters. To ensure a positive conditional variance, the values of C, A_{11}, A_{33}, B_{11} and B_{33} are restricted to zero or greater.

[9] Bera and Higgins (1993) and Engle and Kroner (1995) provide detailed analysis of multivariate GARCH models.

[10] Bollerslev et al. (1988), Engle and Rodrigues (1989), Hall et al. (1989), Ng (1991), Bodurtha and Mark (1991), Koutmos et al. (1994) and Giannopoulos (1995) apply some

form of the ARCH and the GARCH models to estimate time-varying betas for different stock markets.

[11] In a GARCH(p, q) model different combinations of p and q may be applied but as indicated by Bollerslev et al. (1992, p. 10) $p = q = 1$ is sufficient for most financial and economic series. Bollerslev (1988) provides a method of selecting the size of p and q in a GARCH model. Tests in this paper were also conducted with different combinations is p and q with $p = q = 2$ being the maximum lag length. Results based on log-likelihood function and likelihood ratio test indicate that the best combination is $p = q = 1$. These results are available on request.

[12] All the GARCH models were estimated by means of the Berndt et al. (1974) algorithm.

[13] The significant MA term may also be due to different news observed by different investors or the same news being interpreted differently by investors. This could create a negative serial correlation, as a result of a process of price adjustment where the price bounces back and forth between centres with different information.

[14] Before the estimation of Equation 7 the stochastic structures of all variables were investigated to check for unit root(s). All variables were found to be stationery in levels by means of KPSS tests and the fractional unit root test. These results are not provided due to their bulk and similarity but are available on request. Stationary in levels implies that variables may be applied in standard OLS regressions.

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