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Breaks and persistency: macroeconomic causes of stock market volatility

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Abstract

In the paper we study the relationship between macroeconomic and stock market volatility, using S&P500 data for the period 1970–2001. We find evidence of a twofold linkage between stock market and macroeconomic volatility. Firstly, the break process in the volatility of stock returns is associated with the break process in the volatility of the Federal funds rate and M1 growth. Secondly, two common long memory factors, mainly associated with output and inflation volatility, drive the break-free volatility series. While stock market volatility also affects macroeconomic volatility, the causality direction is stronger from macroeconomic to stock market volatility.

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1. Introduction

Why does stock market volatility change over time? This question was asked by [Schwert \(1989\)](#) at the end of the 1980s. His goal was to explain the time-varying stock return volatility by means of the time-varying volatility of macroeconomic and financial variables. The basic conclusion of the paper was that “the amplitude of the fluctuations in aggregate stock volatility is difficult to explain using simple models of stock valuation”. [Schwert \(1989\)](#) also found mixed results with respect to the direction of causality between return volatility and the volatility of macroeconomic and financial variables. He found that: (a) inflation volatility predicts stock volatility but only for the sub-period 1953–1987 and stock volatility does not predict inflation volatility, (b) money growth volatility predicts stock volatility in various sub-samples and stock volatility predicts money growth volatility from 1920 to 1952, (c) industrial production volatility weakly explains the volatility of stock returns, while stock volatility helps to predict industrial production volatility in two sub-samples. Overall his results point to a positive linkage between macroeconomic volatility and stock market volatility, with the direction of causality being stronger from the stock market to the macroeconomic variables. Moreover, the level of macroeconomic volatility explains less than half of the volatility of stock returns. In some periods the ratio is even lower: in 1929–1939 the volatility of macroeconomic variables increased but not by a factor of three as in the case of stock return volatility. Finally, he found evidence that stock market uncertainty is higher during recessions than expansions.¹

A weakness in [Schwert \(1989\)](#) is that it does not accurately model the persistence properties of volatility and it ignores the potential downward bias affecting the estimates, due to the use of noisy volatility proxies. In fact, since Schwert’s study there have been many advances in the theoretical and empirical understanding of econometric models for time-varying volatility. Many studies have focused on the causes of persistence of volatility of asset returns, pointing to the presence of structural change, long memory, or both. For instance, [Hamilton and Susmel \(1994\)](#) have found that the conditional variance process of the US stock market can be described by a switching regime model with three persistent states. The interpretation of the authors is that the high volatility state was triggered by general business downturn. These findings have largely been confirmed by [So et al. \(1998\)](#) and [Hamilton and Lin \(1996\)](#), while [Kim and Kim \(1996\)](#) have suggested that the switch to the high volatility state may be due to an increased volatility in the fad component of the returns, rather than to an increase in the volatility of fundamentals. Evidence of switching regimes in the conditional variance process have been also found for some European countries by [Morana and Beltratti \(2002\)](#).

The alternative explanation of long range dependence has been also proposed to account for persistence of the conditional variance process (see for instance [Ding et al., 1993](#); [Baillie et al., 1996](#); [Bollerslev and Mikkelsen, 1996](#); [Andersen and Bollerslev, 1997](#)), with long memory being the consequence, for instance, of the cross-sectional aggregation of a large number of volatility components or news

¹See also [Campbell et al. \(2001\)](#) and [Whitelaw \(1994\)](#).

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