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Time-Frequency Wavelet Analysis of the Interrelationship Between the Global Macro Assets and the Fear Indexes

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Abstract

Understanding the interrelationships of the global macro assets is crucial for global macro investing. This paper investigates the local variance and the interconnection between the stock, gold, oil, forex and the implied volatility markets in the time/frequency domains using the wavelet methodology, including the wavelet power spectrum, the wavelet squared coherence and phase difference, the wavelet multiple correlation and cross-correlation. The univariate analysis reveals that, in some crisis periods, underlying asset markets present the same pattern in terms of the wavelet power spectrum indicating high volatility for the medium scale, and that for the other market stress periods, volatility behaves differently. Moreover, unlike the underlying asset markets, the implied volatility markets are characterized by high power regions across the entire period, even in the absence of economic events. Bivariate results show a bidirectional relationship between the underlying assets and their corresponding implied volatility indexes, and a steady co-movement between the stock index and its corresponding fear index. Multiple correlation analysis indicates a strong correlation between markets at high scales with evidence of a nearly perfect integration for a period longer than a year. In addition, the hedging strategies based on the volatility index lead to an increase in portfolio correlation. On the other hand, the results from multiple cross-correlations reveal that the lead-lag effect starts from the medium scale and that the VIX (stock market volatility index) index is the potential leader or follower of the other markets.

Keywords: global macro markets, fear indexes, financial crisis, wavelet coherence, wavelet multiple correlation and cross correlation

JEL code: C21, E32, F01, F20, F36, G01, G15

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