

# Return distributions and volatility forecasting in metal futures markets: Evidence from gold, silver, and copper

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## Abstract

The characterization of return distributions and forecast of asset-price variability play a critical role in the study of financial markets. This study estimates four measures of integrated volatility—daily absolute returns, realized volatility, realized bipower volatility, and integrated volatility via Fourier transformation (IVFT)—for gold, silver, and copper by using high-frequency data for the period 1999 through 2008. The distributional properties are investigated by applying recently developed jump detection procedures and by constructing financial-time return series. The predictive ability of a GARCH (1,1) forecasting model that uses various volatility measures is also examined. Three important findings are reported. First, the magnitude of the IVFT volatility estimate is the greatest among the four volatility measures. Second, the return distributions of the three markets are not normal. However, when returns are standardized by IVFT and realized volatility, the corresponding return distributions bear closer resemblance to a normal distribution. Notably, the application of financial-time sampling technique is helpful in obtaining a normal distribution. Finally, the IVFT and realized volatility proxies produce the smallest forecasting errors, and increasing the time frequency of estimating integrated volatility does not necessarily improve forecast accuracy. © 2010 Wiley Periodicals, Inc. *Jrl Fut Mark* 31:55–80, 2011

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