Jump Factor Models in Large Cross-Sections

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Abstract: We develop tests for deciding whether a large cross-section of asset prices obey an exact factor structure at the times of factor jumps. Such jump dependence is implied by standard linear factor models. Our inference is based on a panel of asset returns with asymptotically increasing cross-sectional dimension and sampling frequency, and no restriction on the relative magnitude of these two dimensions of the panel. The test is formed from the high-frequency returns at the times when the risk factors are detected to have a jump. The test statistic is a cross-sectional average of a measure of discrepancy in the estimated jump factor loadings of the assets at consecutive jump times. Under the null hypothesis the discrepancy in the factor loadings is due to a measurement error, which shrinks with the increase of the sampling frequency, while under an alternative of a noisy jump factor model this discrepancy contains also non-vanishing firm-specific shocks. The limit behavior of the test under the null hypothesis is non-standard and reflects the strong-dependence in the cross-section of returns as well as their heteroskedasticity which is left unspecified. We further develop inference for assessing the magnitude of firm-specific risk in asset prices at the factor jump events. Empirical application to S\&P 100 stocks documents evidence for exact one-factor structure at times of market-wide jump events.