

# FIRE SALES AND SYSTEMIC RISK

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## Abstract

Fire sales and, more generally, the sudden deleveraging of large financial portfolios, have been recognized as a destabilizing factor in recent (and less recent) financial crises and systemic risk events, contributing to unexpected spikes in volatility and correlations of asset returns and resulting in spirals of losses for investors. In particular, unexpected increases in correlations across asset classes have frequently occurred during market downturns, leading to a loss of diversification benefits for investors, precisely when such benefits were desirable.

In this mini-course, we propose a tractable framework for quantifying the impact of fire sales on the dynamics of a multi-asset financial market. We derive analytical expressions for the impact of fire sales on the realized volatility and correlations of asset returns in a fire sales scenario and show that our results provide a quantitative explanation for the spikes in volatility and correlations observed during such deleveraging episodes. We then develop econometric tools which are useful for the forensic analysis of fire sales episodes, using observations of market prices. We illustrate our methodology by applying it to the forensic analysis of two recent deleveraging episodes: the Quant Crash of August 2007 and the Great Deleveraging following the default of Lehman Brothers in Fall 2008.

The outline of the mini-course is the following:

- (1) Description of contagion phenomena during financial crises and systemic risk events
- (2) Modeling the dynamics of financial assets in the presence of feedback from fire sales
- (3) Measuring fire sales flows from covariance dynamics