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Dynamic Hedging Under Jump Diffusion with Transaction Costs

It is well known that the standard model of asset price processes, Geometric Brownian Motion, is not capable of reproducing the fat tails in observed price distributions. From a risk management point of view, the most troubling aspect of commonly used models is their inability to provide a useful hedging strategy in the presence of jumps.

If the price process follows a jump diffusion, it is known that a perfect hedge is not possible with a finite number of hedging instruments. It is also conventional wisdom that hedging with options is too expensive, due to the large transaction costs typical of the option market.

In this study, we suggest a dynamic hedging strategy based on hedging with the underlying and liquid options. We solve an optimization problem at each hedge rebalance date. We minimize both the "jump risk" and the transaction cost.

Simulation studies of this strategy, using typical market bid-ask spread data for the options, shows that using the underlying and options in the hedge portfolio does an excellent job of minimizing jump risk, as well as being not too costly in terms of total cumulative transaction costs.

This is joint work with Shannon Kennedy and Ken Vetzal.