

Jump and Cojump Risk in Subprime Home Equity Derivatives

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Discussion

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Summary/Outline of the Paper

- Model jumps in credit default swap (CDS) prices and housing future prices
- Model co-jumps (co-movement) in these two series
- Link jumps in these series to news regarding subprime mortgage market crisis
- Predict jump risk
- Help regulators diagnose potential problems before they reach a crisis level

Jump Literature

Realized Volatility: $RV_{t+1}(\Delta) \equiv \sum_{i=1}^{1/\Delta} r_{t+i\Delta,\Delta}^2$, where $\Delta = \frac{1}{M}$, M=number of intervals

In FX markets and sampling at 5-minute intervals $\Delta = \frac{1}{288}$, RV_t = daily volatility

Realized Bipower Variation: $BV_{t+1}(\Delta) \equiv \frac{\pi}{2} \sum_{i=2}^{1/\Delta} |r_{t+i\Delta,\Delta}| |r_{t+(i-1)\Delta,\Delta}|$

The contribution to the quadratic variation due to the jumps or discontinuities in the underlying price process can be consistently estimated by $J_{t+1} \equiv \max[RV_{t+1}(\Delta) - BV_{t+1}(\Delta), 0]$ as $\Delta \rightarrow 0$ or $M \rightarrow \infty$

The test statistic $z_{t+1} = \frac{RV_{t+1}(\Delta) - BV_{t+1}(\Delta)}{RV_{t+1}(\Delta)}$ has a standard normal distribution.

$$\sqrt{\left(\left(\frac{\pi}{2}\right)^2 + \pi - 5\right) \frac{1}{M} \max\left(1, \frac{RTQ_{t+1}}{BV_{t+1}(\Delta)^2}\right)}$$

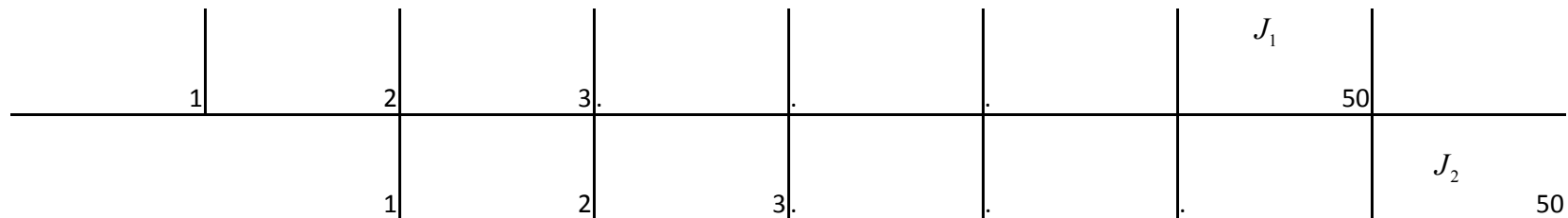
This Paper

Realized Volatility: $RV_{t+1}(\Delta) \equiv \sum_{i=1}^{1/\Delta} r_{t+i\Delta, \Delta}^2$, where $\Delta = \frac{1}{M}$, $M=50$ days

$RV_t = 50$ – day volatility

Realized Bipower Variation: $BV_{t+1}(\Delta) \equiv \frac{\pi}{2} \sum_{i=2}^{1/\Delta} |r_{t+i\Delta, \Delta}| |r_{t+(i-1)\Delta, \Delta}|$

The author defines jumps or discontinuities as $J_{t+1} \equiv \max[RV_{t+1}(\Delta) - BV_{t+1}(\Delta), 0]$ and computes the z-test statistic over a rolling sample period:



Compare Jump Literature to this Paper

- The fact that J_2 is statistically significant, does not mean that there was a jump on the 50th day of the second sub-sample.
 - All we can say is that there was a jump (or more than one jump) on that 50-day period
- When we move from five minute price changes to daily price changes. Can we really talk about JUMPS?
- The purpose of the literature is to separately identify the continuous component of the quadratic variation (realized volatility) from the discontinuous or jump component of the quadratic variation of the price process. Jumps are meant to be large, sudden (quick), and infrequent.

Compare Jump Literature to this Paper (continued)

- ABD (2007) find that the jump series accounts for 7% - 14% of total volatility.
- The authors find that jumps contribute anywhere from 5% to 81% of total volatility!
- ABD (2007) find that jumps are much less persistent (and predictable) than the continuous sample path dynamics.
- The authors find that jumps are persistent (in two out of the three tranches).
- Is the author estimating jumps or volatility?

Monte Carlo Experiment

- The author acknowledges that his method is different from the jump literature and understands that the asymptotic theory does not apply to his method.
- Hence he performs a Monte Carlo Experiment.
- He simulates a 1-minute price process and compares the J obtained with his method with J obtained using a five-minute sampling frequency with non-overlapping samples.
- But the two J 's are not comparable. One estimates the probability of a jump occurring on one day, the other estimates the probability of a jump occurring in a 50-day period.
- The Monte Carlo experiment shows that the rolling daily estimator has good properties when jumps contribute 76% of total volatility. Not surprising.

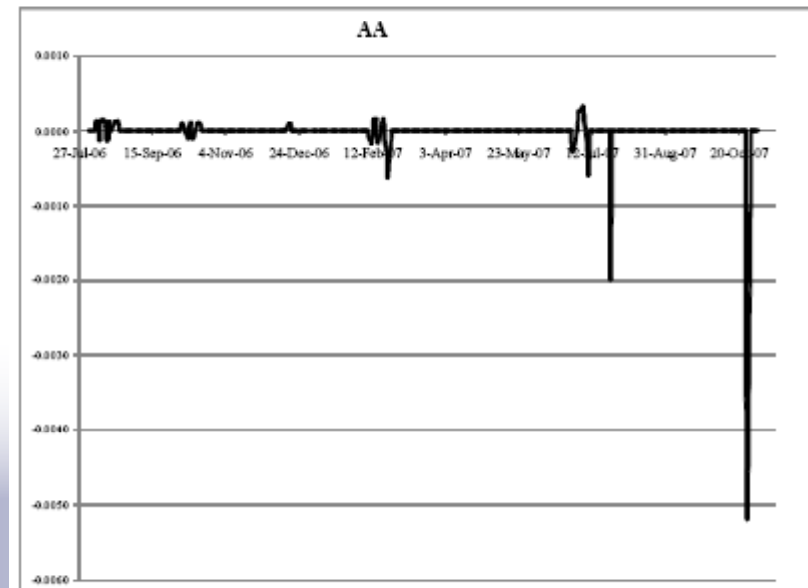
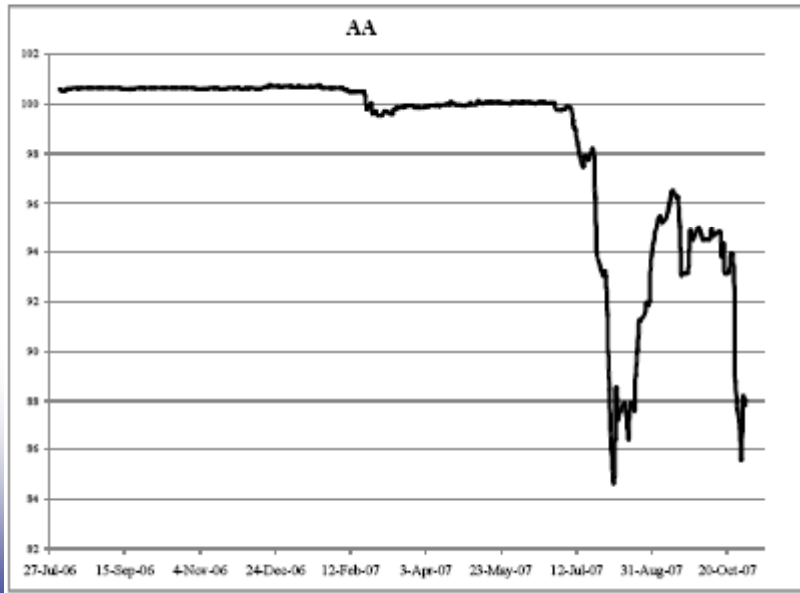
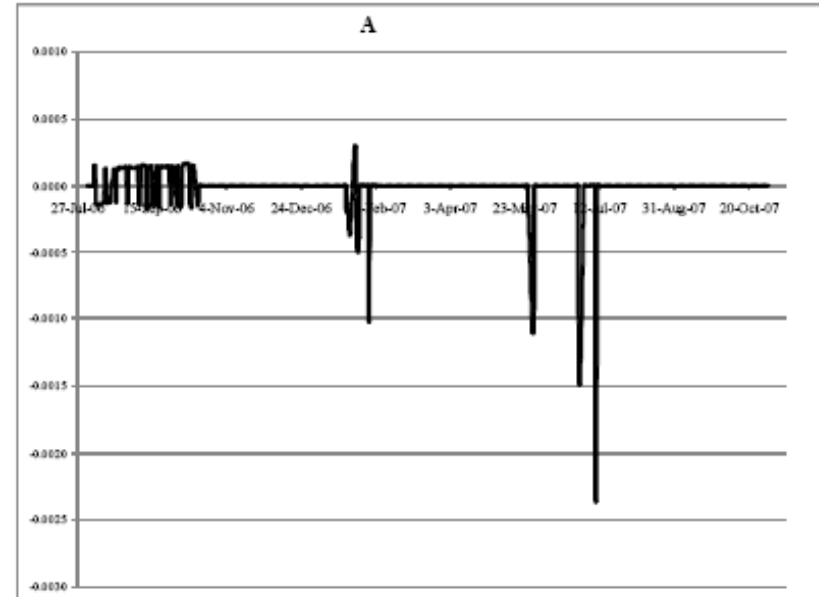
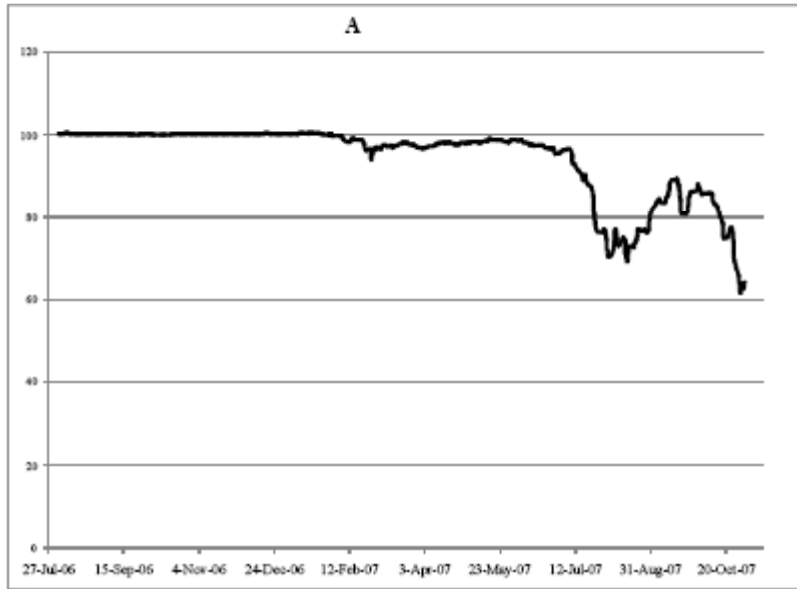
Monte Carlo Experiment (continued)

- The Monte Carlo experiment shows that the rolling daily estimator misses jumps. So the authors conclude that if they detect jumps then they should be important.
- Not sure this is the right conclusion. If they detect jumps, then looking at RV maybe as good as looking at Jumps

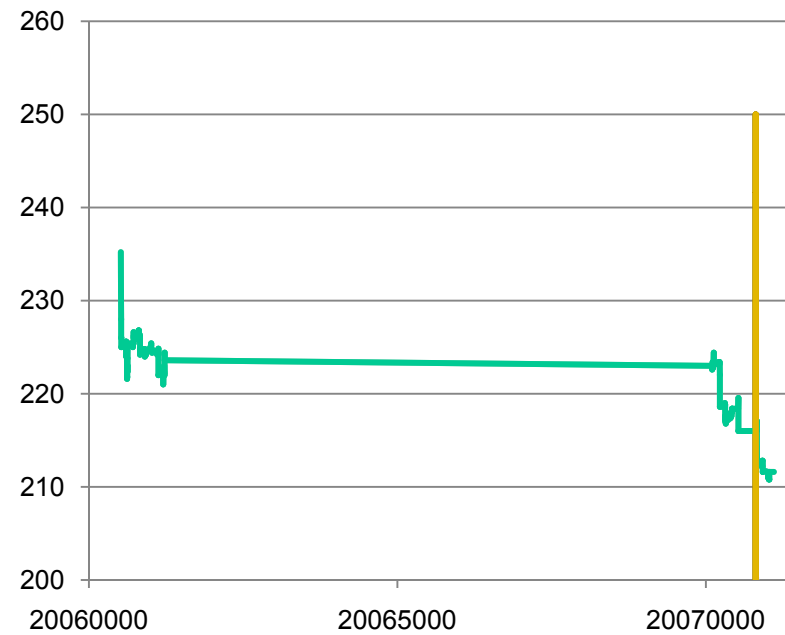
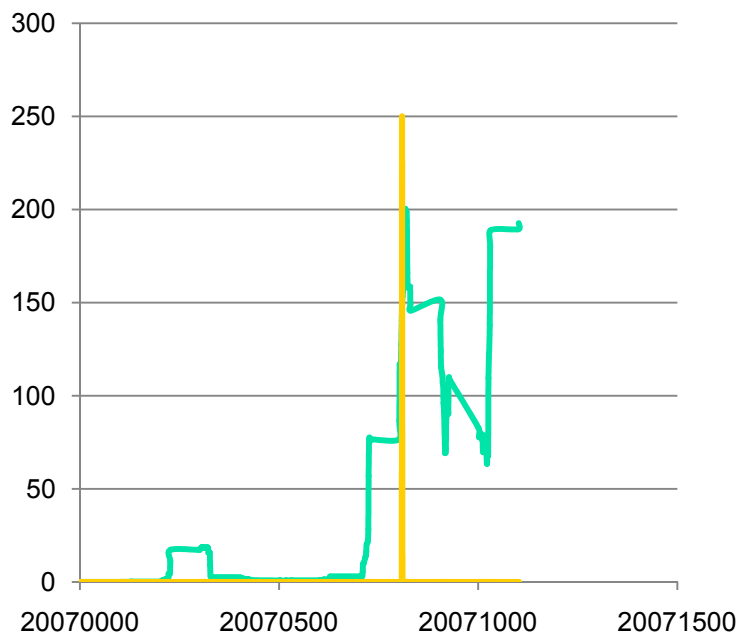
Purpose of the Paper

- Is the purpose of the paper to predict crisis in the housing market?
- The authors apply their method to one event.
- It is not possible to evaluate the author's method using only one event. The authors need to apply their method to predict other "crisis."

CDS ABX Price for the A and AA Tranches and Significant Jumps



Realized Volatility of ABX Price for the “A” Tranche and Housing Futures Price Index



Purpose of the Paper (continued)

- If the purpose of the paper is to predict crisis in the housing market, then the CDS price series maybe a better predictor than jumps or volatility in this series.

Conclusions

- Spirit of the jump literature is very different from the method used in this paper
- Is the purpose of the paper to predict crisis before they occur? Very difficult to do (one event). Apply method to other events.
- Should we focus on jumps or the price series?
- Can the housing futures curve predict CDS price changes?

Other Comments

- Calculate bipower variation skipping one return (the CDS return series appears serially correlated).
- How can you sign jump direction using the daily return? Since you calculate jumps over a 50-day period.
- What is the purpose of the co-jump section? To analyze tail-event co-movement?