

Aggregate Jump and Volatility Risk in the Cross-Section of Stock Returns

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Summary

General idea:

- ① Test: **aggregate jump and volatility** risks are priced in the CS of stocks
- ② How: **option-based factors** sensitive to **only** jump or volatility changes
- ③ Show: **contemporaneous relation** between factor betas and returns
 - Single/ double sorts (EW and VW portfolios) by factor betas
 - Fama-MacBeth regressions with a number of controls
 - Robustness checks using predicted (instead of current) betas
- ④ **Contributions:**
 - Disentangle **jump** and **volatility risks**
 - Conclude that **both types of risks are priced**

Impressions and “Line of Attack”

① Economics

Supported by theory, consistent with other studies:

- Rare (market) events risk \Rightarrow large fraction of ERP and VRP (BT2011)
- VRP \Rightarrow aggregate stock returns (BTZ2009)

② Factors

- Assume that diffusive risk is fully neutralized by Δ -hedge
- Jump risk/ difference between jump and “simple” market factor risk
- How well do the factors really disentangle the risks?
- Linear factor model?

③ Data issues

- Daily returns: good and bad news
- Sample? Not defined...

④ Analysis and results

- Look consistent and nice, but there are some issues..

Volatility Factor

Calendar ratio spread of zero-beta straddles: $\Delta = 0, \Gamma = 0, V > 0$

Jump Factor

Calendar ratio spread of zero-beta straddles: $\Delta = 0, \Gamma > 0, V = 0$

Daily rebalancing \Rightarrow empirically almost uncorrelated

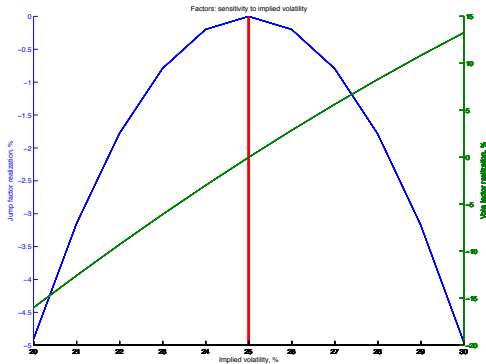
Let's simulate and check exactly...

- 1 What risks do these factors represent
- 2 How well are the factors uncorrelated when these risks are realized

Factors construction II

Sensitivity to implied $\{\sigma^P - \text{VolIRP}\}$ volatility (BS settings):

- 15/45 days maturity, $\sigma = 25\%$ \Rightarrow factor return for $\sigma \pm 5\%$

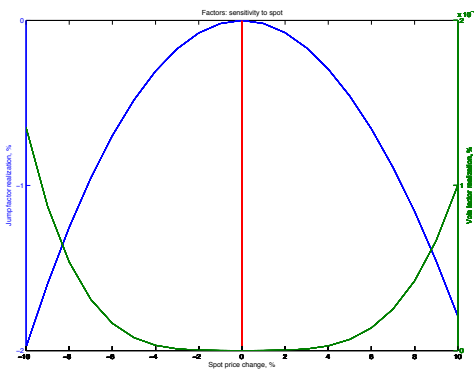


- Correlation between factors $\approx 5\%$
- **Non-linearities** (e.g., Jones 2006); **vanna** hedge for Jump Factor?
- $\Delta\sigma \Rightarrow$ always negative shock in Jump Factor: **fear of any instability?**

Factors construction III

Sensitivity to spot (BS settings):

- 15/45 days maturity, $S_0 = 100 \Rightarrow$ factor return for $S_0 \pm 10\%$



- Correlation between factors $\approx -95\%$, especially \uparrow when jumps occur..
- Extreme non-linearities...higher Greeks? would not believe it helps, but..
- Why don't we like positive jumps? ICAPM intuition?

Sample not defined:

- ① Some CRSP stocks, all CRSP universe?
- ② Filters for data? Sample selection/survival bias? How many stocks?
- ③ More later in “Analysis and Results”

Daily frequency of source data:

- ① Good news for factors: non-linearities not that large
 - ② Bad news for factors: effect of transaction costs not clear
 - ③ Bad news for analysis: bid-ask bounce bias with “constant” weights
see Asparouhova et al (JFE2010, JF forth) for details
- ⇒ use daily factors, monthly data for portfolios/ FM
- ⇒ apply explicit correction for bid-ask bounce bias

Analysis and Results I

Potential issues with the Results:

- 1 Beta-return relation: contemporaneous vs predicted beta
(here only robustness section, and the results are much weaker)
- 2 Factors:
 - Volatility factor: mean $\approx -7.5\%$ p.a., **significance?**
 - Jump factor: mean $\approx -40\%$ p.a., **significance?**
 - Price of volatility risk from sorting $\approx -8.8\%$ – close to TS mean above
 - Price of jump risk from sorting $\approx -35\%$ – close to TS mean above
 - **With past betas sorting results are much weaker and jump risk premium changes sign**

3 Sorting/FM

- Non-monotonic beta-return relation: theory? monotonicity test?
all action is in extreme portfolios
- Rich interaction between jump/volatility and MKT, SMB, HML betas
- Double sorts are dangerous
- VW evidence is enough (EW to robustness, FM is EW anyway)
- Use monthly returns for robustness/ bid-ask bias correction

4 Data/ sample problems

- Table 3 (contemporaneous): VW sorted portfolio returns are around 20%
- Table 8 (past betas): VW sorted portfolio returns are around 10%
- CRSP VW returns over the same sample period are around 10%

⇒ numbers are good, but not consistent!

Conclusion

Good luck with the paper!