Discussion: How Much Does the Weighted Price Contribution Measure Price Discovery?
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Motivation

- Microstructure increasingly vital to understanding markets.¹
  - ⇒ knowing where to look for price discovery is useful.
- Study price discovery metric: $WPC^2$
  - $WPC$ for sequential markets; $IS$ for parallel markets?
- Why we care: decompose where/when of price discovery.
  - Does price discovery happen in options markets?³
  - Does new regulation affect where/when of price discovery?
  - *Price Theory!*: price signals our economy; critical importance.
- Objective: explore $WPC$; valid price discovery measure?
  - 1. Theoretical: Asymptotic proofs of $WPC$ behavior.
  - 2. Empirical: Study known sequential market (night vs day).

¹Like particle physicists wrt microelectronics, or Tim Johnson’s quote.
²$WPC = \text{Weighted Price Contribution}$ of Barclay and Warner (1993).
³Muravyev, Pearson, and Broussard (2013): no; Sinha and Dong (WP): sometimes yes.
Theoretical/asymptotics show WPC:
- Mostly measures ratio of volatilities, not returns;
- Efficient estimate of Information Share (IS) if not AR.
- $WPC \neq IS$: mainly due to day-night return correlation.
- $WPC \neq IS$: not strongly affected by skewness, kurtosis.

$WPC$ is valid if $r \sim (0, \sigma^2 I)$ (or close)
- Problem 1: returns over longer time periods are not close to 0.
- Problem 2: correlations b/w sequential markets often high.

Motivation

- Really need to emphasize how important price discovery is.
  - Now key to regulation, monitoring, market design
- Motivate with sequential markets examples, possibilities:
  - FX price discovery outside normal hours = manipulation?
  - Changes in where macro-important prices set (e.g. oil).
  - Firm’s credit becomes scarier in some regions (e.g. CDS).
- Especially promising: use with vast high-frequency data:
  - Can we get leading signals of changing economy?
  - Can we detect market trouble, changing fears in real-time?
- Paper gets technical; must remind people why they care.
I think it would help to give a little more context.

- Explain how price discovery measures usually work.
- Can appeal to theory of ANOVA (which many measures are).

Specifically: Your modified IS needs better explanation.

- Comes from a VAR. Is model selection, matrix pruning done?
- Some variables not clearly defined (i?); hard to follow.
- Some variables are non-standard. (e.g. A vs Φ or Ψ)
- Add table of variable definitions for easy reference.
- Give variables economic meaning. (e.g. meaning of h?)
- How does your modified IS work for sequential markets?
Price Discovery Metrics in General

- However, also fair to ask what these measures get at.
- In particular, many of these are versions of ANOVA.
- Good: ANOVA is one of older, more well-understood methods.
- Bad: Not always interested in main source of variation.
  - Often, \textit{control} for main source of variation (\textit{e.g.} noise).
  - Bounce is part of variance: \( \hat{\sigma}^2 = \sigma^2 + 2c^2 \).
  - Why HF volatility estimators may blow up as \( \Delta t \to 0 \).
  - \textit{WPC, IS}: Bounce adds to price discovery. Really?
  - Similarly: In PCA, do we always care most about PC1?
Since you analyze behavior of WPC, analysis must be solid.

Concern with equation 7: Not sure it is correct.

- In particular, I suspect \( E(r_{it} \text{ sgn } r_t) \geq 0 \).
- Think of the problem like a Brownian Bridge.
- \( r_t \) has realized drift over \( t \in (0, 1) \) (\( \tilde{r}_t \)).
- Subsamples of \( r_t \) have expected drift \( \Delta t \tilde{r}_t \).
- So WPC may be even more flawed than you find.

Also worried about \( \sigma_i, \sigma_{-i} \) usage.

- Depending on conditioning, these may well be correlated.

Good person to consult at UTS: Alan Huang.
Empirical Analysis

- The empirical analysis needs to be much better motivated.
- I wasn’t sure what I should expect to see going in.
- Commentary on findings was a bit terse; let it breathe.
- Also of interest besides $WPC - IS$: $\text{Var}(WPC - IS)$.
  - Probably some factors which make one noisier than other.
  - But those factors might not necessarily bias difference.
- Small point regarding index “opening value”:
  - For quoting, use previous close until stock opens.
  - For derivative settle (SQ), use open price of each stock.
Conclusion

- Nice paper with a lot of potential.
  - Measures help assess relative market importance, quality.
  - Who cares? Regulators, policy makers, academics, industry.
- Many price discovery methods are ad hoc, poorly understood.
- Shines a light on common yet un-understood measure.
  - I believe findings are sound: WPC appears flawed.
  - However, cannot try a murderer on burglary charges.
  - Need to work hard on conditioning; bulletproofing proofs.
- Also highly policy relevant due to concerns about:
  - Ability to measure value added by decentralized trading;
  - Effects of high-frequency trading;
  - Effects of taxing trades, quotes; and,
  - Need for real-time monitoring of price discovery, breakdowns.