Volume, Volatility, and Public News Announcements
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Discussion

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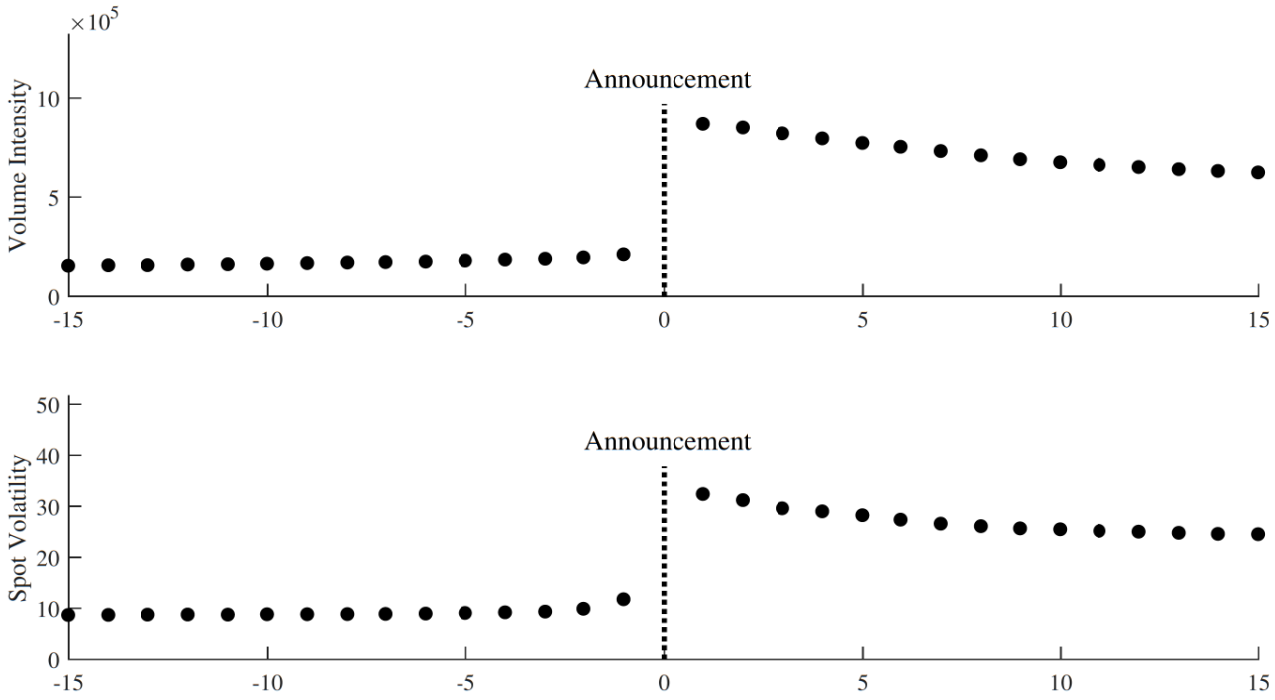
Summary

- Use high frequency data on S&P500 ETF (1 mn) returns to study how volume and volatility behave in a 30mn window around FOMC and several macroeconomic intraday announcements.
- Stylized facts are that
  - Both volume and volatility jump up at the annoucements.
  - Jump in volume not systematically related to return jump (which could be zero).
  - The elasticity of the jumps in (log) volume to (log) volatility is significantly less than 1.
  - The elasticity is decreasing in measures of disagreement (such as the cross-sectional dispersion of analysts' forecasts).
- Propose a very intuitive (and useful) Diff-in-Diff jump regression estimator (and bootstrap procedure), which provides further econometric support for the fact that volume-volatility elasticity is less than one and lower when disagreement is high.
- This is consistent with predictions of Kandel-Pearson's model of differences-of-opinion.

Volume and volatiilty jump on announcements

Figure 4: Average volume intensity and volatility jumps around FOMC announcements

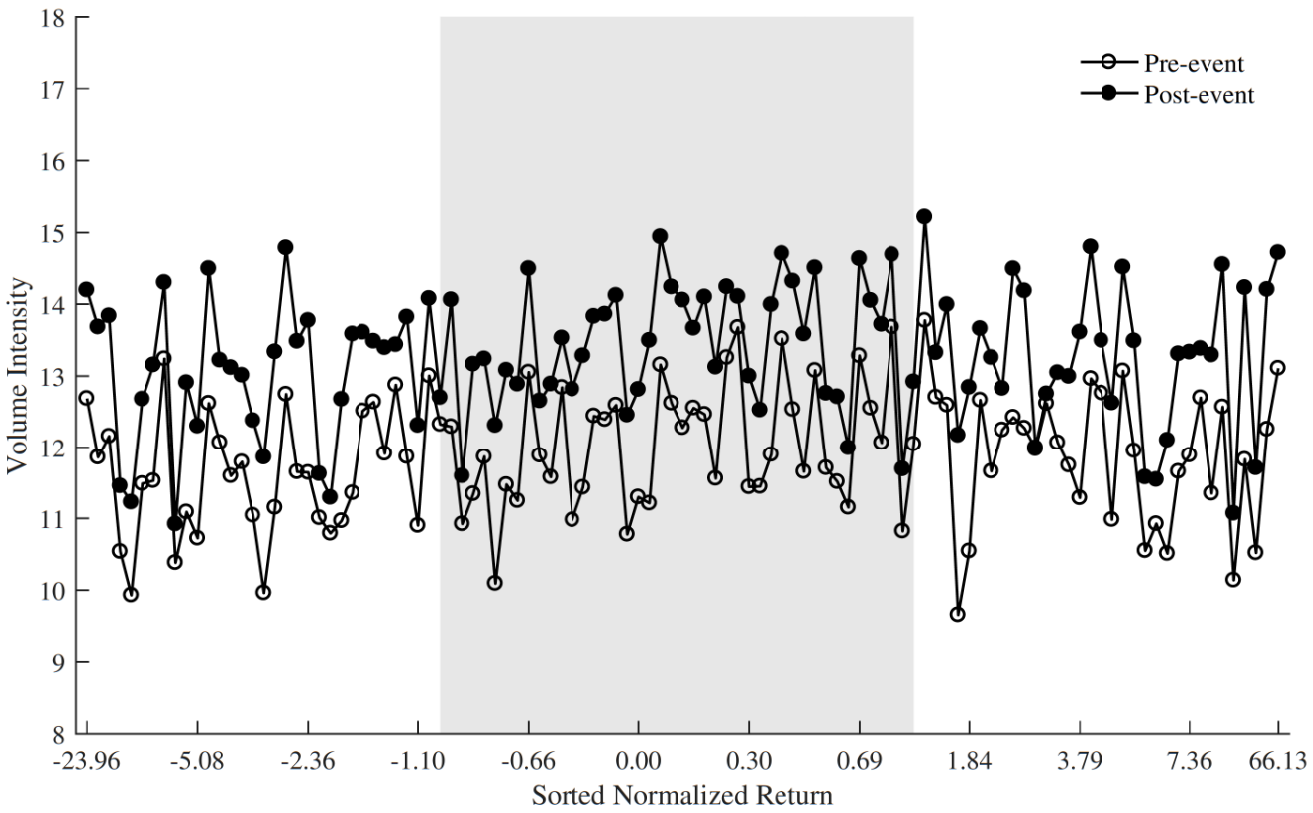


Notes: The figure plots the nonparametric estimates of the volume intensity and volatility before and after an "average" FOMC announcement. We compute $\hat{m}_{\tau\pm s}$ (resp. $\hat{\sigma}_{\tau\pm s}$) for s ranging from 15 minutes before to 15 minutes after each FOMC announcement, and plot the averages across all of the announcements in the top (resp. bottom) panel. The local window is set to $k_n = 30$.

- Nice facts about behavior of volume and volatility around FOMC meetings and other several Macro announcements.
- Confirms lower frequency evidence (e.g., Karpoff (1987)).

No clear volume-return relation around announcements

Figure 6: Sorted volume around FOMC announcements

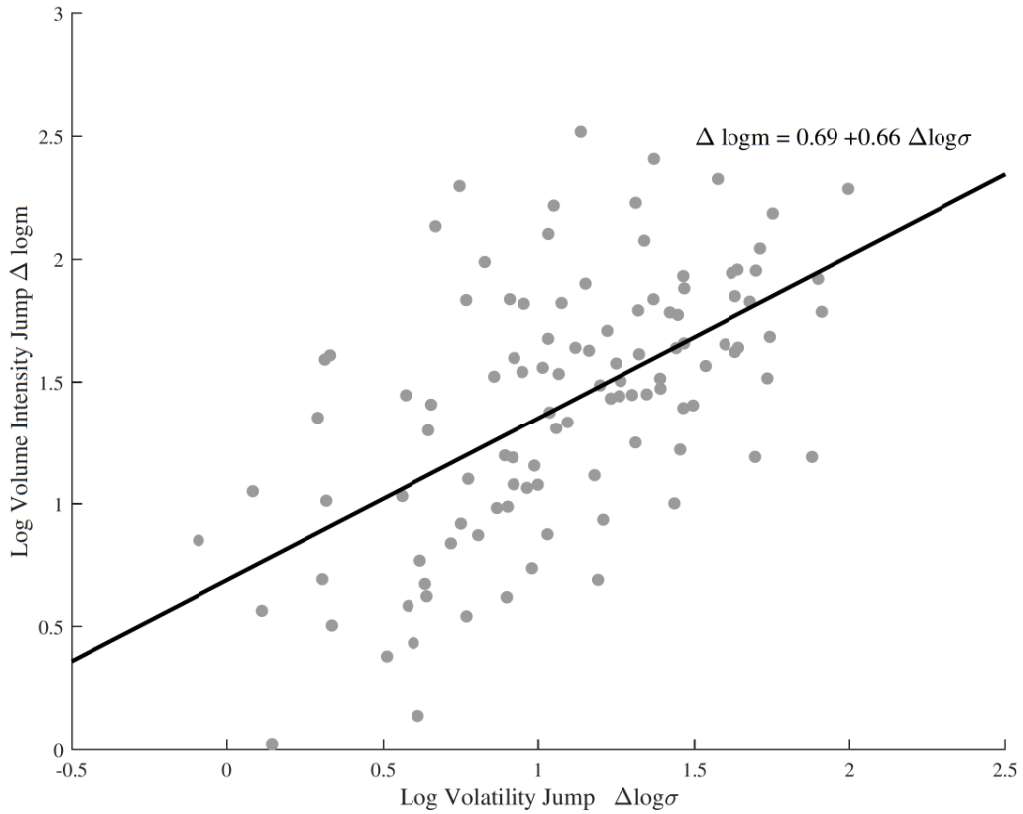


Notes: The figure shows the pre- and post-event log volume intensities sorted on the basis of the 1-minute normalized returns $r_{i(\tau)}/\hat{\sigma}_{\tau-}\sqrt{\Delta_n}$ around FOMC announcements (dots). The normalized return increases from left to right. Announcements with normalized returns less than 1 are highlighted by the shaded area.

- consistent with differences in opinions model of Kandel and Pearson.

Elasticity of jumps in log volume to jumps log volatility

Figure 7: Volume and volatility jumps around FOMC announcements



Notes: The figure shows the scatter of the jumps in the log-volume intensity versus the jumps in the log-volatility around FOMC announcements. The line represents the least-squares fit.

- Sensitivity of volume to volatility < 1.
- Is this sensitivity smaller when disagreement is larger?

A formal 'jump in regression Diff-in-Diff' test

- Want to estimate

$$\Delta V_\tau \approx a_0 + b_0 X_\tau + (a_1 + b_1 X_\tau)\Delta\sigma_\tau$$

- Natural to use 'jump regression':

$$\min_{a_i, b_i} \sum_{\tau \in \mathcal{A}} \{\Delta V_\tau - (a_0 + b_0 X_\tau) - (a_1 + b_1 X_\tau)\Delta\sigma_\tau\}^2$$

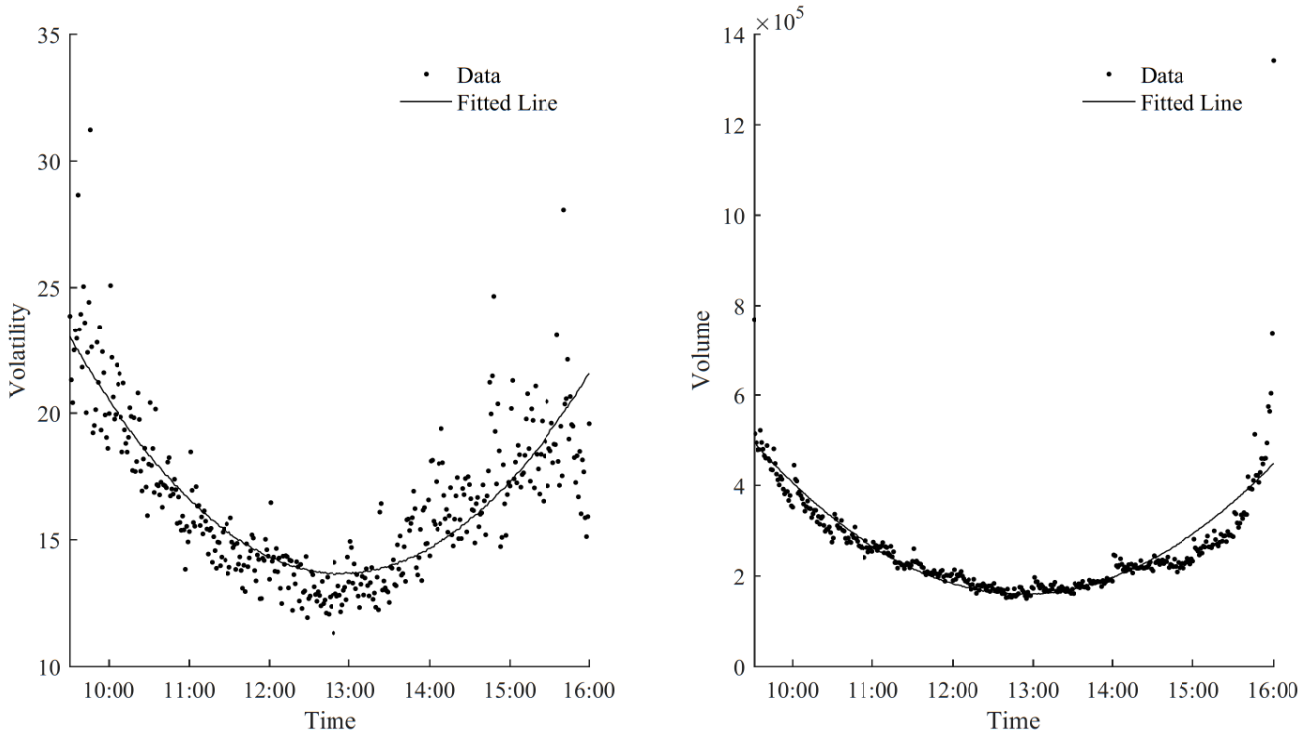
- But because of intraday patterns in volume and volatility the estimators may be 'contaminated', so use 'Diff-in-Diff jump regression' to single out effect due to announcement.

$$\min_{a_i, b_i} \sum_{\tau \in \mathcal{A}} \left\{\widetilde{\Delta V_\tau} - (a_0 + b_0 X_\tau) - (a_1 + b_1 X_\tau)\widetilde{\Delta\sigma_\tau}\right\}^2$$

where $\widetilde{\Delta V_\tau}$ is the jump in volume observed on an announcement date in excess of the average jump in volume observed at the same time-of-day on non-announcement days.

Intraday patterns are very significant.

Figure 3: Intraday patterns of volatility and volume



The Diff-in-Diff 'works'

Table 3: Volume and volatility jumps around public news announcements

Events	All	FOMC	ISMM	ISMNM	CC	Others
No.Obs.	2130	109	160	158	160	1682
			No DID			
Log Volatility	0.090**	1.088**	0.162**	0.072**	0.114**	0.023**
	(0.004)	(0.027)	(0.017)	(0.018)	(0.015)	(0.005)
Log Volume	0.034**	1.410**	0.056**	-0.045**	0.049**	-0.045**
	(0.004)	(0.023)	(0.015)	(0.013)	(0.015)	(0.005)
			DID			
Log Volatility	0.152**	1.037**	0.256**	0.165**	0.209**	0.087**
	(0.006)	(0.029)	(0.017)	(0.020)	(0.017)	(0.005)
Log Volume	0.204**	1.329**	0.335**	0.233**	0.328**	0.118**
	(0.005)	(0.025)	(0.015)	(0.015)	(0.015)	(0.006)

Notes: The table reports the average logarithmic volatility jumps and the average logarithmic volume intensity jumps around all announcements (All), which are further categorized into FOMC announcements (FOMC), ISM Manufacturing Index (ISMM), ISM Non-Manufacturing Index (ISMNM), Consumer Confidence Index (CC), and other pre-scheduled macroeconomic announcements (Others). The top panel reports the raw statistics. The bottom panel adjusts for the intraday pattern via the DID method using the past 22 non-announcement days as the

Kandel and Pearson's differences-in-opinion model

- Myopic agents with constant risk tolerance ρ trade at $t = 0$ and $t = 1$ an asset with liquidation value A at $t = 2$.
- Two types of agents ($i = 1, 2$) start with prior $A \sim N(m_0^i, h_0^i)$ at $t = 0$
- At time $t = 1$ all observe a public signal $S = A + \epsilon$, where $\epsilon \sim N(\mu_i, s_i)$, so that each agent can form her posterior $A \sim N(m_1^i, h_1^i)$ based only on her interpretation of S.
- At every date t myopic agents demand assumed to be $x_t^i = \rho h_t^i (m_t^i - P_t)$
- Market clearing $\sum_i \alpha_i x_t^i = 0$ gives the 'equilibrium' price $P_t = \sum_i \frac{\alpha_i h_t^i}{\sum_j \alpha_j h_t^j} m_t^i$

$\Rightarrow$ The price is a weighted average of each agent's posterior estimate of A obtained without conditionning on price.

- Volume is affine in price change: $Vol = \alpha_i |x_1^i - x_0^i| = |a(\mu_2 - \mu_1) + b(P_1 - P_0)|$.

$\Rightarrow$ If agents have different opinions about the signal $\mu_2 \neq \mu_1$ then there will be trade after the announcement, even if prices do not move.

$\rightarrow$ Expected volume is increasing in price volatility.

$\rightarrow$ Increasing disagreement $(\mu_2 - \mu_1)$ reduces the sensitivity of expected volume to volatility.

Is the KP model the right benchmark?

- The three-date KP model does not seem ideal to think about a jump in price volatility around event.
- Intuition developed in the paper is based on assuming that price volatility is exogenous and independent of disagreement.
- If instead we assume that price volatility increases linearly in disagreement, then the intuiton that the volume-volatility elasticity should be < 1 and decrease with the level of disagreement does not necessarily hold.

$\Rightarrow$ requires a dynamic multi-period DO model, where volatility is stochastic and jumps upon announcement to provide an appropriate null.

- Banerjee (RFS 2011) provides a dynamic model that nests both RE and DO. His proposition 1 states that in the DO model, higher disagreement leads to lower expected returns, lower return volatility, and lower covariance between absolute returns and volume. The opposite predictions hold in the RE model. However, his empirical findings are more supportive of the RE model.
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Concluding Comments

- This is a very nice paper which offers:
  - New stylized facts on volume and volatility around high-frequency FOMC and macro-announcements for S&P500 and Treasury bond futures.
  - New, intuitive, and useful 'Diff-in-Diff jump regression' methodology.
- Would be nice to develop theory of stochastic volatility and volume (with and without DO) to provide null hypothesis (if agents are risk-averse, a jump in volatility could lead to trade, e.g., because of differences in leverage or risk exposure).
- It seems relatively uncontroversial that agents interpret public signals differently, because the model of the world is not common-knowledge, and they may entertain different models (approximations).
- It seems more controversial (?) that agents do not condition on price at all as many 'agree to disagree' models imply!
- This likely misses important features of trading in financial markets (e.g., Keynes' 'beauty contest'). Is a model in which agents 'agree to disagree' and do not condition/coordinate based on price likely to explain (?)
  - The 1987 Crash,
  - The flash-crash(es)
  - The internet/tech or the subprime housing 'bubbles,' or even
  - The intraday pattern in volume and volatility.