

Discussion of “Risky Intraday Order Flow and Equity Option Liquidity” by Doshi, Pederzoli, and Sert

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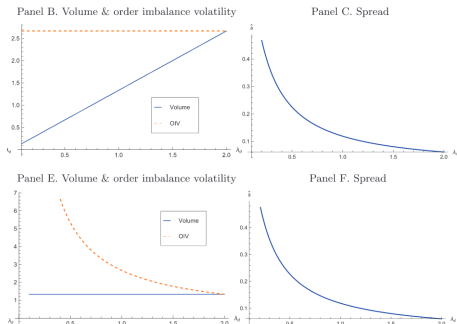
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Overview

- This paper examines the relation between order flow volatility (OFV) and daily effective spreads in the option market
- Main findings:
 - Strong positive relation for both SPX options and individual stock options
 - Not explained by volume/volatility controls and market-maker inventory variables
 - Impact of OFV is greater for short maturity options
 - Multi-exchange trading: indirect costs are larger

High-frequency order imbalance volatility

- “Bad volume” vs “good volume”



- Why high-frequency measure?
 - Increase in buy imbalances in the morning followed by increase in sell imbalances in the afternoon
 - Daily imbalance is unchanged, whereas OIV captures increased inventory volatility for LP

Strong positive association with spreads for stocks

Bogousslavsky and Collin-Dufresne (2023)

$$\log s_{i,t} = \alpha_i + \beta_\tau \log \tau_{i,t} + \beta_\sigma \log \sigma_{i,t} + \beta_{\text{HFOIV}} \log \text{HFOIV}_{i,t} + \text{ctrls} + \epsilon_{i,t}$$

Median Value across Years							
Small Stocks				Large Stocks			
β_τ	-0.15 (-26.29)	-0.33 (-33.60)			0.04 (3.41)	-0.28 (-19.71)	
β_σ	0.42 (37.00)	0.46 (45.05)			0.35 (19.01)	0.46 (30.95)	
β_{HFOIV}		0.20 (16.34)				0.29 (19.47)	
$\beta_{\Delta\tau}$			-0.08 (-13.62)	-0.24 (-26.46)			0.13 (7.66) -0.23 (-19.71)
$\beta_{\Delta\sigma}$			0.32 (30.02)	0.36 (36.59)			0.30 (17.14) 0.39 (31.14)
$\beta_{\Delta\text{HFOIV}}$				0.17 (16.34)			0.29 (22.56)
$R^2(\%)$	27.70	31.46	9.25	13.15	16.63	26.19	7.99 19.02

Note the strong relation with (realized) volatility

Comments

- Paper is clear and well executed, with many robustness checks
- My comments will focus on getting more economic intuition
 - ① Comparison to other measures of inventory costs and takeaways for the literature
 - ② Leveraging the individual stock options results

Comparison to other measures of inventory costs

Volatility is associated with higher trading costs under both adverse selection and inventory frameworks

Table IA.3: Time-series Regressions of ES_t on $\log(SD_t)$ for SPX Options

Panel A: Calls								
	0	1-6	7-13	14-20	21-27	28-34	35-41	42-48
$\log(SD_t)$	0.02*** (4.11)	0.02*** (7.3)	0.007*** (7.01)	0.003*** (3.81)	0.003*** (5.47)	0.004*** (6.71)	0.001*** (3.08)	0.001 (1.34)
$\log(\text{volume}_t)$	0.001 (0.19)	-0.013*** (-4.89)	0.002** (2.29)	0.003*** (4.95)	0.002*** (4.13)	-0.0001 (-0.45)	0.002*** (4.39)	0.002*** (5.64)
$ OI_t $	-0.016** (-2.06)	0.002 (0.5)	0.001 (0.81)	0.001 (1.15)	0.002 (1.47)	0.001* (1.73)	0.002*** (3.49)	0.004*** (4.91)
$R_{M,t}$	-1.939*** (-3.77)	-0.007 (-0.04)	-0.03 (-0.3)	-0.012 (-0.27)	-0.001 (-0.05)	-0.084 (-1.15)	0.022 (0.75)	-0.031 (-0.95)
VIX_t	-0.028 (-0.92)	0.039 (1.63)	-0.011 (-0.86)	-0.005 (-0.69)	-0.002 (-0.05)	0.021** (1.98)	0.046*** (4.21)	0.026*** (2.15)
Time Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1036	2991	2900	2798	2736	2597	2363	2166
Adj. R ²	0.484	0.304	0.64	0.664	0.681	0.629	0.703	0.675

- VIX measures implied volatility over next 30 days
 - May not be appropriate for short-term options (and seems confirmed in the data)
 - The concern is that it “explains” the option maturity result
- Volatility increases option price (denominator of spread)
- Use realized volatility (or a forecast of intraday volatility)?

Comparison to other measures of inventory costs (2)

Table 7: Market-Maker Inventory Variables

Panel A: SPX Calls								
Days to Maturity	0	1-6	7-13	14-20	21-27	28-34	35-41	42-48
$\log(SD)_t$	0.02*** (4.33)	0.011*** (5.51)	0.006*** (5.43)	0.004*** (4.88)	0.004*** (6.92)	0.005*** (8.36)	0.003*** (5.94)	0.002*** (4.87)
$\log(\text{volume})_t$	0.001 (0.3)	-0.0001 (-0.03)	0.003** (2.3)	0.002** (2.28)	0.001 (1.55)	-0.002*** (-3.05)	-0.0001 (-0.3)	0.001* (1.68)
$ \text{Order Imbalance}_t $	-0.008 (-0.58)	0.009* (1.9)	-0.001 (-0.31)	-0.001 (-0.47)	0.002 (1.19)	0.0001 (0.27)	0.002 (1.42)	0.001 (0.94)
$ \text{MM NetInventory}_{t-1} $	-0.026** (-2.01)	-0.008 (-1.36)	-0.001 (-1)	-0.001 (-0.99)	-0.001 (-1.55)	-0.001 (-0.81)	-0.001* (-1.87)	-0.001 (-1.26)
$ \text{MM GammaInventory}_{t-1} $	1.026* (1.71)	0.575* (1.77)	0.061 (0.57)	0.0001 (0.0001)	0.164 (1.33)	0.146 (1.26)	0.327*** (2.7)	0.257 (1.4)
$R_{M,t}$	-1.921*** (-3.97)	0.179 (1.07)	0.02 (0.19)	0.0001 (0.0001)	0.009 (0.23)	-0.129 (-1.26)	0.02 (0.5)	0.025 (0.6)
VIX_t	-0.084** (-2.13)	-0.094*** (-4.89)	-0.04*** (-3.9)	-0.017** (-2.48)	-0.014** (-2.25)	-0.015* (-1.78)	-0.007 (-0.94)	-0.004 (-0.47)
Time Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	996	2642	2838	2747	2685	2542	2307	2111
Adj. R ²	0.471	0.512	0.384	0.358	0.316	0.362	0.33	0.349

Strikingly (at least to an outsider), none of the literature's inventory variables works!

- Are they subsumed by order flow volatility ($\log(SD)$)?
- This seems important to clarify for the literature

Leveraging the individual stock option results

Currently, the individual stock option results are presented like a robustness check for the SPX results

⇒ exploit cross-sectional variation across securities

- 1 Order imbalance persistence is likely to vary across securities
 - This has implications for the importance of OFV over absolute order imbalance
 - They convey the same information with highly persistent order flow
- 2 Stoikov and Saglam (2009) suggest different implications for spread-inventory dynamics based on the liquidity of the underlying stock
 - Role of delta hedging? Control for stock liquidity variables?

Additional suggestions

- Report simple correlations
 - Inventory risk of SPX options with different maturities
- Behavior of the measure intraday, closer to expiration, and around news announcement?
- Pricing implications?
 - Christoffersen et al. (2018) find that effective spreads strongly predict option returns

In summary

- Nice paper that shows convincing evidence of a positive relation between order imbalance volatility and spreads in the options market
- More results to build economic intuition would strengthen the paper
 - To get broader takeaways for the literature, it might be important to explain the effect (or lack of effect) for all considered variables (such as volatility)
 - Does it change our perspective on existing results?
- Good luck!