Discussion of “FX Trading and the Exchange Rate Disconnect” by Martin Evans

Vincent Bogousslavsky

Boston College

NBER SI 2019 International Asset Pricing

Microstructure approach to exchange rates

- Importance of order flow for exchange rate dynamics (Evans and Lyons (2002))
  - Daily order flow explains 63% (40%) of daily changes in DM-$ (yen-$) whereas the change in one-day interest rate differential explains only 0-1% (sample: May-Aug 1996)
  - Contemporaneous return-order flow relation strong in all asset classes (e.g., 28% R^2 for equity market daily return (Chordia et al. (2002)))
- Is order flow related to fundamentals or due to transitory liquidity effects?
- Does order flow have predictive power for future returns?

This paper

- Microstructure model of limit order book trading is developed to disentangle liquidity and information channels

- VAR system (motivated by the model) is estimated using EUR/USD intraday data
  - 2003-2015 data from an electronic LOB platform (EBS)
  - *Variables:* order flow; volume; depth balance; total depth; spread; change in log midpoint

$\Rightarrow$ One type of shocks drives 87% of the 1-60mn variations in FX prices

$\Rightarrow$ FX movements are connected to interest rate differentials via trading flows

Overview

Useful and interesting to use LOB information over a long sample to understand FX movements

1. Fundamental information in the model
2. VAR system and VAR-model ‘disconnect’
3. Exchange rate disconnect empirical results

Model

Traders do not observe the depth of the order book

- At time t, traders submit limit orders:

$$p_t^{\text{bid}} = \mu_t - \frac{1}{2}\delta + \beta E_t d_t^{\text{buy}}$$
$$p_t^{\text{ask}} = \mu_t + \frac{1}{2}\delta - \beta E_t d_t^{\text{sell}}$$

- At time t^*, all traders receive signals about depth and depth balance, but only market traders can submit orders at an expected trade price $= (1 - \omega)p_t^{\text{bid/ask}} + \omega E_t^* p_{t+1}^{\text{bid/ask}}$ (ω does not depend on expected depth)

Where does fundamental information come from?

At $t+1$, traders update their estimate of fundamental value:

$$\mu_{t+1} = \mu_t + \underbrace{n_{t+1}}_{\text{news shock}} + \underbrace{\lambda(flw_{t+1} - E_t flw_{t+1})}_{\text{price impact}}$$

- Unexpected order flow is informed, but market traders don't update μ_t after receiving the balance/depth signals (equ. (2))
- The (fundamental) information must then come from outside the model (order flow shocks)
- But then limit traders should condition on the signals (E_t^*) to compute the expected flow since the balance/depth signals are *not* informative about fundamentals

Insights from the model

$$p_t = \underbrace{\mu_t}_{\text{information}} + \underbrace{\frac{1}{2}\beta E_t \text{depth balance}_t}_{\text{liquidity}}$$

- Depth balance is mean-reverting (inventory management), which generates return/order flow predictability
- Order book (balance) shocks have a *permanent* price impact due to the above

The idea that order book shocks contribute to price discovery makes sense and is empirically supported in other markets:

- Fleming, Mizrach, and Nguyen (2018); Brogaard, Hendershott, and Riordan (2019)
- Important! But not clear in the current model

VAR system

Ordering: order flow, volume, balance, depth, spread, Δp

- It makes sense to allow order book innovations to affect prices contemporaneously
- Except that price shocks are allowed to affect order flow (and depth balance) *contemporaneously*

Departure from standard MM setup that deserves an in-depth discussion and robustness checks

Disconnect between model and VAR

Long-run restrictions: balance ($+$ depth, spread) shocks do **not** have a permanent impact

- Balance shocks in the VAR vs. balance shocks in the model

Explain better why the Δp innovation is interpreted as a balance shock (and not the balance innovation itself)

- Balance innovations do not account for the variance of the order flow and price change... Do we even need them?

Empirical results

The “order flow” innovation accounts for $\approx$ 87% of the variance of Δp over horizons of 1-60mn

$$\text{flw}_t \approx a(L)v_t^1 + b(L)v_t^6$$
$$\Delta p_t \approx c(L)v_t^1 + d(L)v_t^6$$

Innovation components aggregated at the daily level

Sample	Variable	Specification			
		I: $flow_t^1$		II: $flow_t^6$	
A: 2003-2015					
(3388 obs)	$\Delta(i^{(yr)} - i^{*(yr)})$	-3.995***	-3.964***	0.276	0.356
		(0.613)	(0.602)	(0.673)	(0.660)
	lag	no	yes	no	yes
	$\overline{R}^2$	0.038	0.041	0.000	0.072

flw[1] component sign. related to interest rate differentials

Empirical results (2)

dependent variable: Δp_t

2003-2015							
$\Delta(i^{(yr)} - i^{*(yr)})$	-1.979***	-2.028***					
	(0.300)	(0.285)					
Δp^1			0.742***	0.759***	1.027***	1.029***	
			(0.017)	(0.017)	(0.052)	(0.052)	
lags	no	yes	no	yes	no	yes	
$\overline{R}^2$	0.048	0.051	0.656	0.673	0.559	0.588	

- Last 2 columns: instrument Δp^1 with Δi
- Δp_t is mostly driven by v^1, hence any variable correlated with Δp_t is likely to be correlated with v^1
  - Δi is correlated with v^1 and not with v^6 (already in the previous table)
- Regressing flw^1 on Δi yields low R^2 (previous table); maybe try other variables to benchmark the results

Misc. comments/suggestions

- Prices may be more sensitive to order flow at specific times of the day
  - Might be useful to get more intuition: inventory vs. information effects (Madhavan, Richardson, and Roomans (1997))
- More details on the institutional setting (traders do not observe the depth of the limit order book) would help
- Robustness to share-weighted measures (avoid price effects)
- $\frac{1}{2}\delta$ in (2)?

Conclusion

Interesting paper, I learned a lot reading it

- Clarify the role of fundamental information in the model
- Motivate better the empirical specification (price shocks affect order flow contemporaneously, no permanent impact of order book events)
- Importance of order book variables is not crystal-clear from the empirical results: what if we drop these variables?
- My view: more focus on the VAR and other empirical results, less on the model
    - How surprising is it that the order flow innovation is correlated with the interest rate differential?