Trading Volume, Illiquidity and Commonalities in FX Markets

Angelo Ranaldo
University of St. Gallen

Paolo Santucci de Magistris
LUISS and CREATES

American Finance Association Meetings
05 January 2020, San Diego (CA)

University of St.Gallen

Why is important?

- Floating FX rates, open economies, and growing capital mobility call for a better understanding of FX volatility, trading volume and illiquidity.

- Paucity of data on FX global volume.

- Relevant for international investors and policy makers e.g. implementing monetary and financial stability policies.

What we do?

- Unified **theory** for trading volume, volatility, and illiquidity in a multiple currency setting.

- **Empirical** analysis of their main determinants and main pricing implications.

Theoretical framework

- FX rate movements are determined by common information, or **news**, and differences in traders' reservation prices, or **disagreement**, that induce trading.

- Novelties: **continuous time** and **multiple currencies**.

- Investors' disagreement is the **common determinant** of trading volume and volatility of each FX rate.

- The **no-arbitrage** condition is the "glue" connecting FX rates and creating **commonality** in trading volume, volatility, and illiquidity.

Empirical predictions

1. Traders' **disagreement** drives both trading **volume** and **volatility**.

2. The ratio of volatility to volume **measures illiquidity** (Amihud 2002) that decreases with market **depth** and **number of active traders**.

3. Trading volume, volatility and liquidity across FX rates are linked by **no-arbitrage** constraints, which lead to the **commonalities** across FX rates.

    ▪ Commonalities increase with traders' **disagreement** across rates and the strength of the **correlation** between these FX rates.

    ▪ **Synthetic volume** and **illiquidity** are positively related to the variability of the **arbitrage price violations**.

Data

- ## CLS trading volume

  - **Hourly trading volume** / # of trades for **30 currency pairs** (15 currencies) – Nov. 2011 to Nov. 2016

  - Intraday FX **global** trading volume and illiquidity (Fischer and Ranaldo 2011; Hasbrouck and Levich 2017; Gargano et al. 2017; Ranaldo and Somogyi 2019).

- ## Olsen FX rates

  - 1-min first, last, ask, bid, high, and low quotes to compute realized variances and transaction costs.

- ## EBS data

  - 100-millisec snaps of trades and quotes from the interdealer segment.

Intraday volume and volatility

EUR/USD
FX rate Volume and RPV
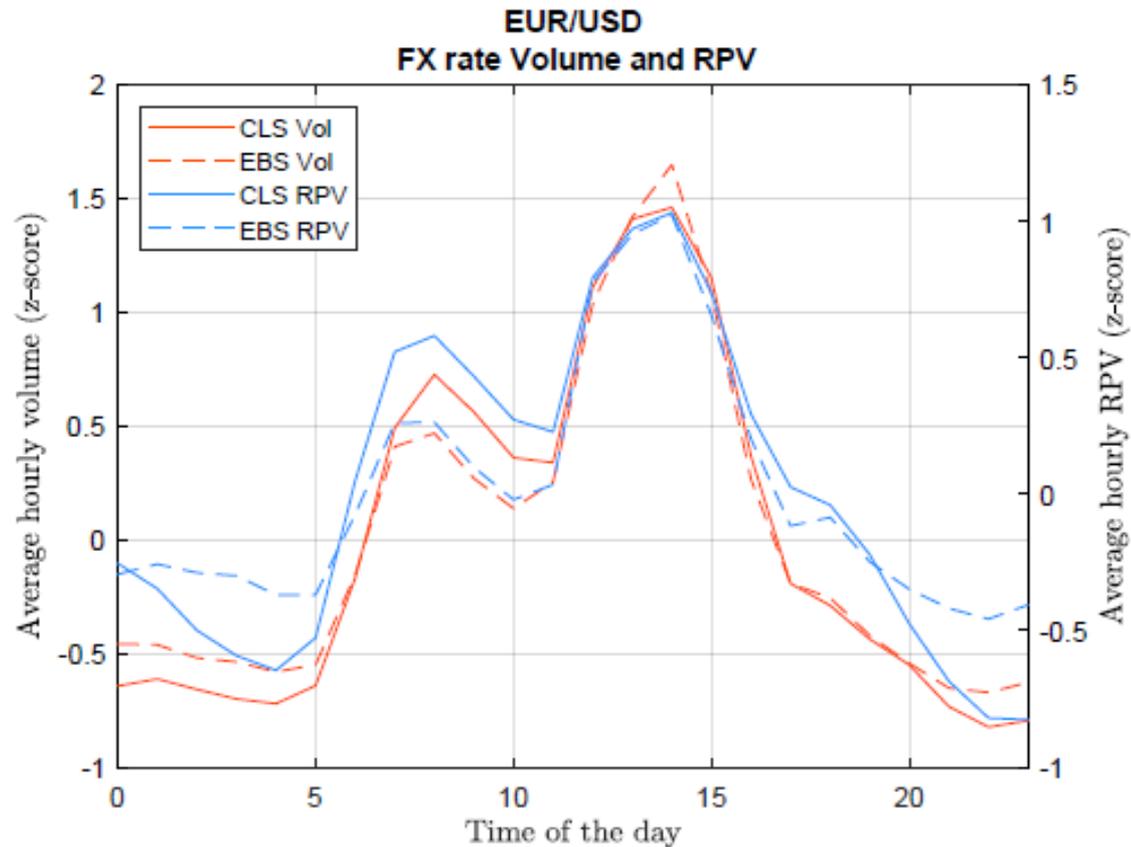
- Volume and volatility governed by a **common latent factor**

Disagreement

	All currencies against USD			
	(1) Δ **Volume**	(2) Δ **RPV**	(3) Δ **HF Amihud**	(4) Δ **Rel. BAS**
Δ Disagreement	0.0591^b	0.2202^a	0.0594^b	0.0494^a
	(2.56)	(4.26)	(2.56)	(3.58)
Δ Illiquidity	0.0504^a	0.4496^a	0.1785^a	0.1234^a
	(2.94)	(5.75)	(4.62)	(8.88)
Lagged Dep.	-0.3775^a	-0.2708^a	-0.2412^a	0.0262
	(-8.81)	(-3.81)	(-4.70)	(0.61)
Constant	-0.0053	-0.0128	-0.0008	-0.0075^c
	(-0.72)	(-0.82)	(-0.12)	(-1.73)
R^2	0.140	0.335	0.283	0.281
N	577	577	577	577

- Volume and volatility increase with disagreement.

Illiquidity
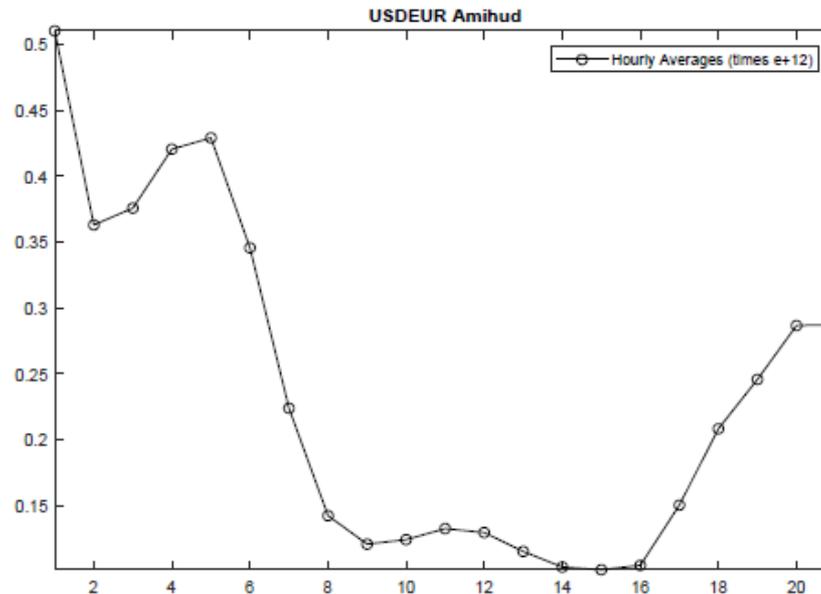
- **Illiquidity** as the ratio between (realized) volatility to volume decreases with market **depth** and number of **active traders**.

Liquidity measurement

|	A_t	BAS_t	EC_t	CS_t	R_t	γ	A_t^*
A_t	1.0000	0.7885	0.6680	0.3877	0.7068	0.9115	-0.0671
BAS_t	0.9080	1.0000	0.7944	0.5247	0.6594	0.7923	-0.0115
EC_t	0.8712	0.9128	1.0000	0.5701	0.8901	0.7455	0.0687
CS_t	0.5460	0.6335	0.6570	1.0000	0.4730	0.4285	-0.0784
R_t	0.6791	0.5696	0.7950	0.4361	1.0000	0.7690	0.0289
γ	0.9041	0.7759	0.8332	0.5583	0.7523	1.0000	-0.0304
A_t^*	0.4005	0.4326	0.3683	-0.0873	0.1933	0.2138	1.0000

- Our FX HF illiquidity measure correlates with other well established measures of market illiquidity.

Commonalities

Three methods

- Principal Component Analysis

- Connectedness index (Diebold and Yilmaz 2014)

- Regression analysis

- All results indicate **strong commonality** in volume, volatility and illiquidity,

- Which is stronger for heavily traded and **liquid** currencies $\rightarrow$ Liquidity begets liquidity.
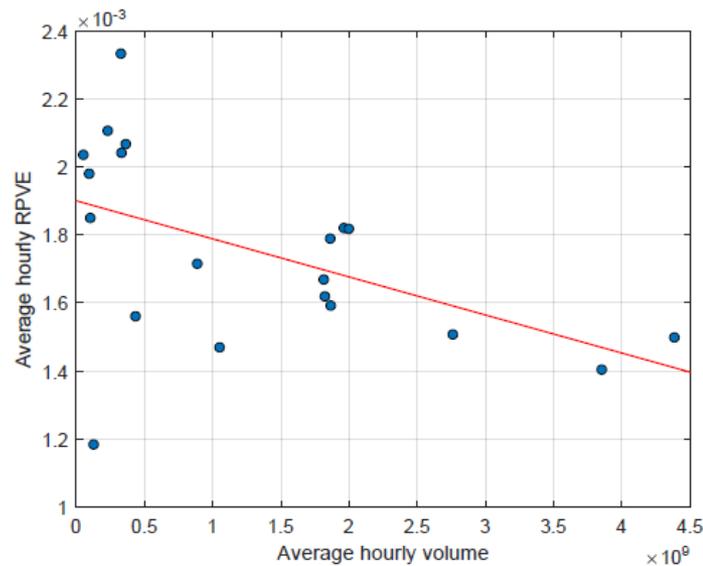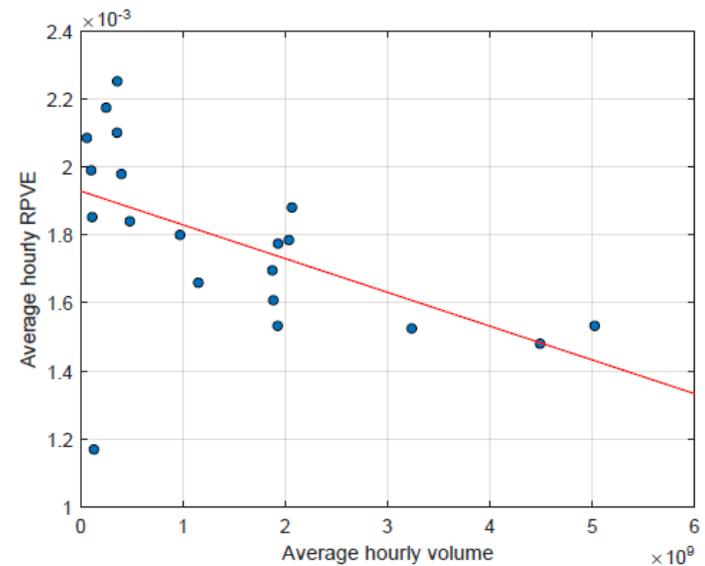
Pricing implications
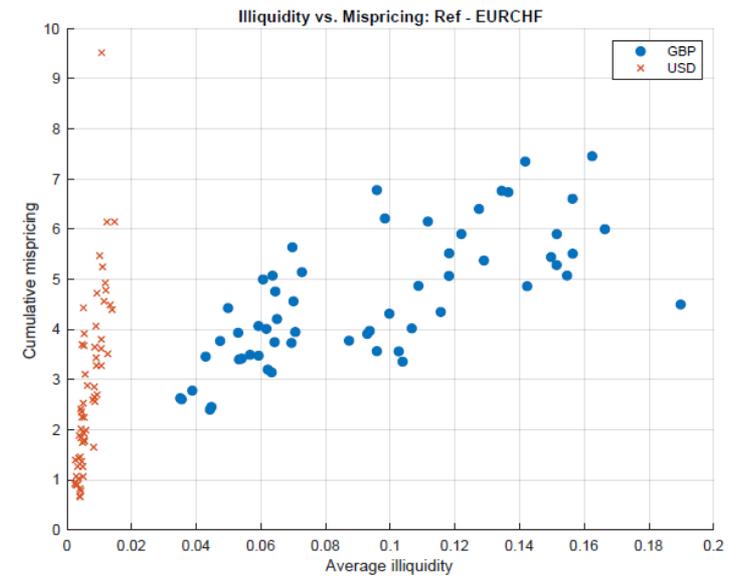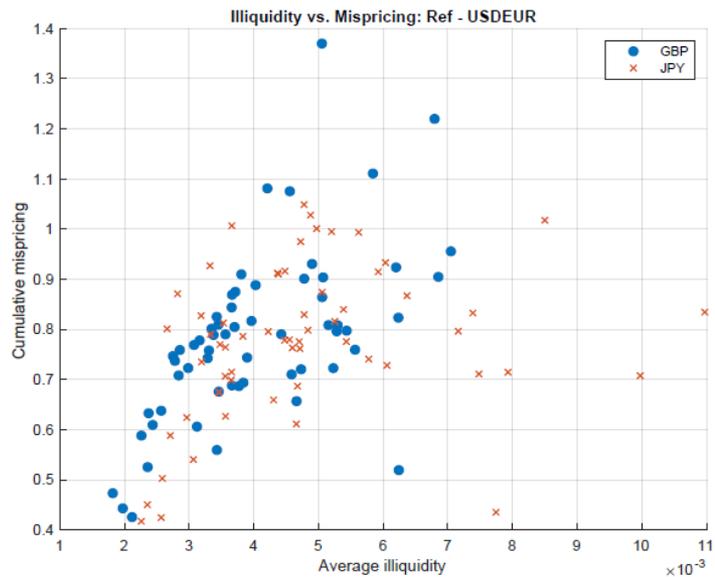
(a) Pricing error variation against illiquidity: USDEUR   (b) Pricing error variation against illiquidity: EURCHF

- Monthly pricing error increases with average illiquidity of the cross rates
- Steeper dependence for more liquid FX rates

Pricing implications

(a) Unconditional

(b) Conditional to co-jump

- Negative relation between mispricing and volume commonality →
  Liquidity begets price efficiency

Conclusion

- Unified **theory** and **empirical** evidence for
  - **Disagreement** as determinant of trading volume and volatility
  - Closed-form and intuitive solution for FX **illiquidity measure**
  - Arbitrage as the "glue" connecting prices and creating **commonalities**

- **Liquidity begets liquidity**, as most traded and liquid currencies have stronger commonality.

- **Liquidity begets efficiency**, as most traded and liquid currencies stick to (triangular) arbitrage condition.