FX Order Flow as a Predictor

Ernest Chan, Ph.D.

About Me

- I have been a quantitative researcher/trader for Morgan Stanley, Credit Suisse, and various hedge funds since 1997.
- I am the principal of QTS Capital Management which manages a hedge fund as well as client accounts.
- Books:
  - *Machine Trading: Deploying Computer Algorithms To Conquest the Markets.*
  - *Algorithmic Trading: Winning Strategies and Their Rationale* (Wiley, 2013).
  - *Quantitative Trading: How to Build Your Own Algorithmic Trading Business* (Wiley 2009).
- I write a trading blog: epchan.blogspot.com

What is Order Flow?

- Order flow = signed transaction volume (trade size).
  - Buy market order $\Longrightarrow$ order flow > 0
  - Sell market order $\Longrightarrow$ order flow < 0
- Academic research indicates order flow information is leading indicator of price change (E.g. Richard Lyons, 2001).
- Breaking news causes informed traders to issue market orders. ("Toxic flow")
- Order flow can be used at various frequencies.

What is Order Flow?

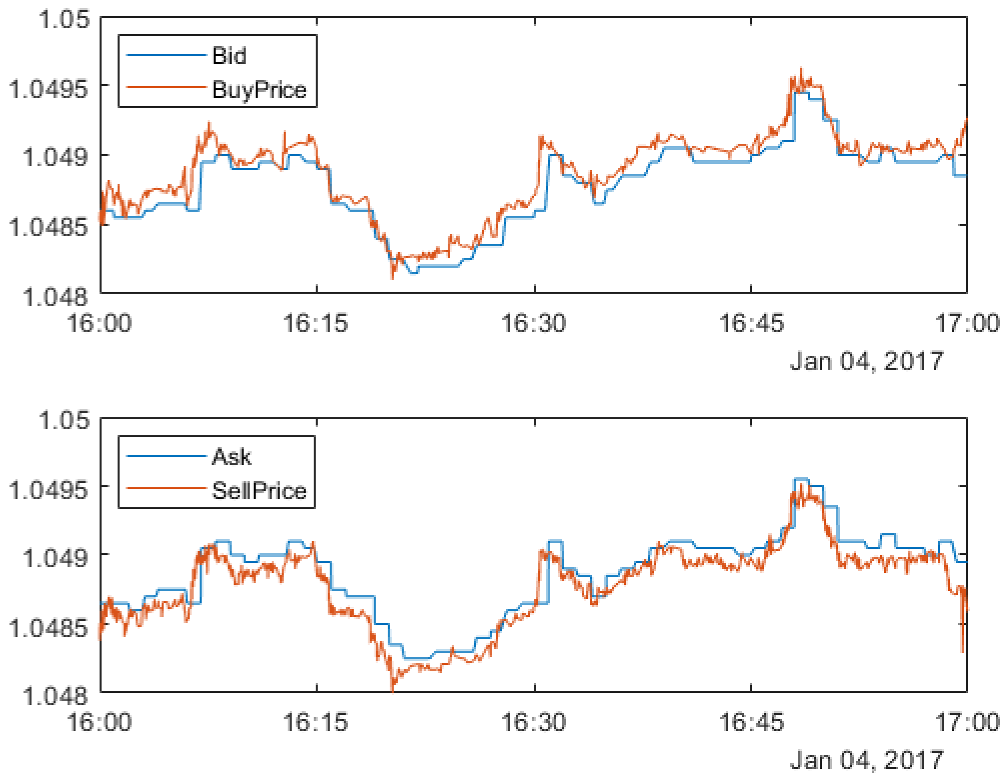
- E.g. I send a MKT order to buy 1,000,000 EUR.USD.
  - Order flow of EUR.USD for this trade is +1,000,000
- E.g. You send a MKT order to sell 5,000,000 USD.JPY
  - Order flow of USD.JPY for this trade is -5,000,000.
- Typically, we apply a moving average to individual order flow to find short-term aggregate flow.

Order Flow as a Predictor

- E.g. Daily order flow of EURUSD.
  - FXCM 2017 order flow data set.

```
DT,Symbol,Quantity,Rate
01/03/2017 00:00:04.770,AUD/USD,1000,0.71954
01/03/2017 00:00:04.807,AUD/USD,1000,0.71954
01/03/2017 00:00:04.809,AUD/USD,2000,0.71954
01/03/2017 00:00:04.829,USDOLLAR,10,12589
01/03/2017 00:00:04.841,AUD/USD,10000,0.71954
01/03/2017 00:00:04.931,AUD/USD,-1000,0.71942
01/03/2017 00:00:05.019,GBP/CAD,-10000,1.65056
01/03/2017 00:00:05.019,AUD/CAD,-10000,0.96705
01/03/2017 00:00:05.023,CAD/JPY,2000,87.43
01/03/2017 00:00:05.024,EUR/NZD,-1000,1.50905
01/03/2017 00:00:05.024,EUR/USD,20000,1.04577
```

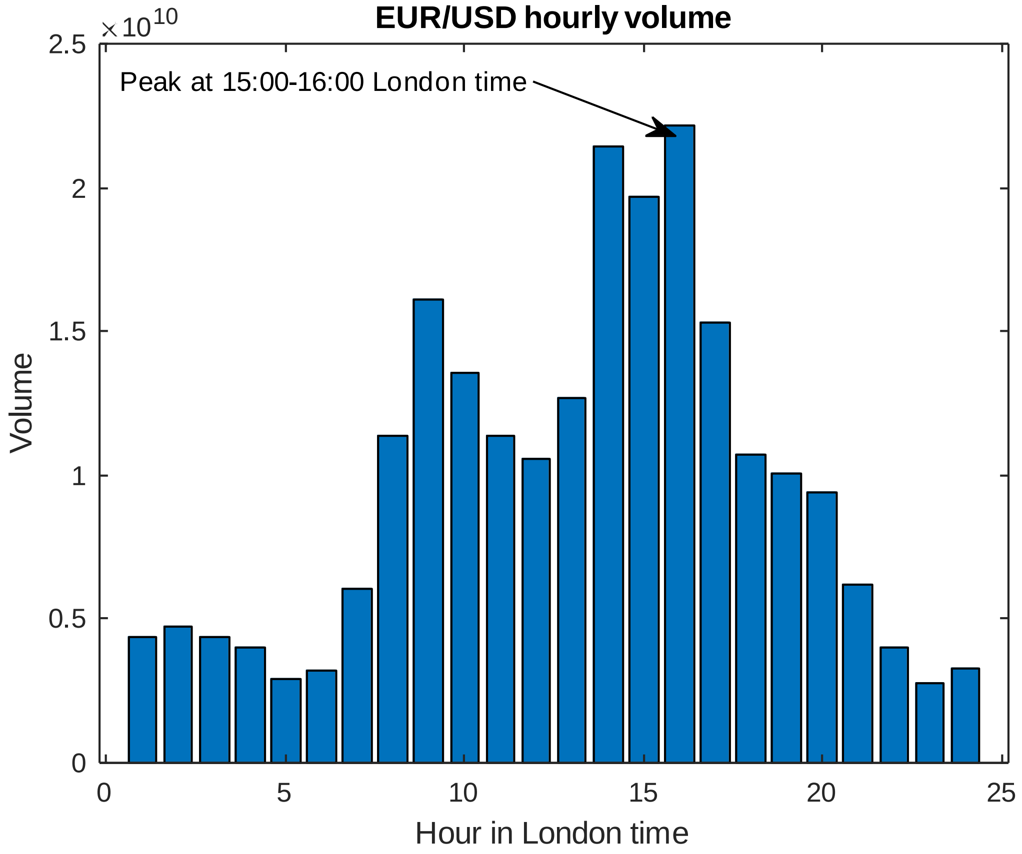
Data sanity check



Bid, ask, trade prices

- Trade prices due to buy MKT orders > bid
  - These generate positive order flow
- Trade prices due to sell MKT orders < ask
  - These generate negative order flow
- Some violations of these rules due to:
  - Quote moved in sub-ms after trade occurred.
  - Delay in reporting of a trade or quote changes.

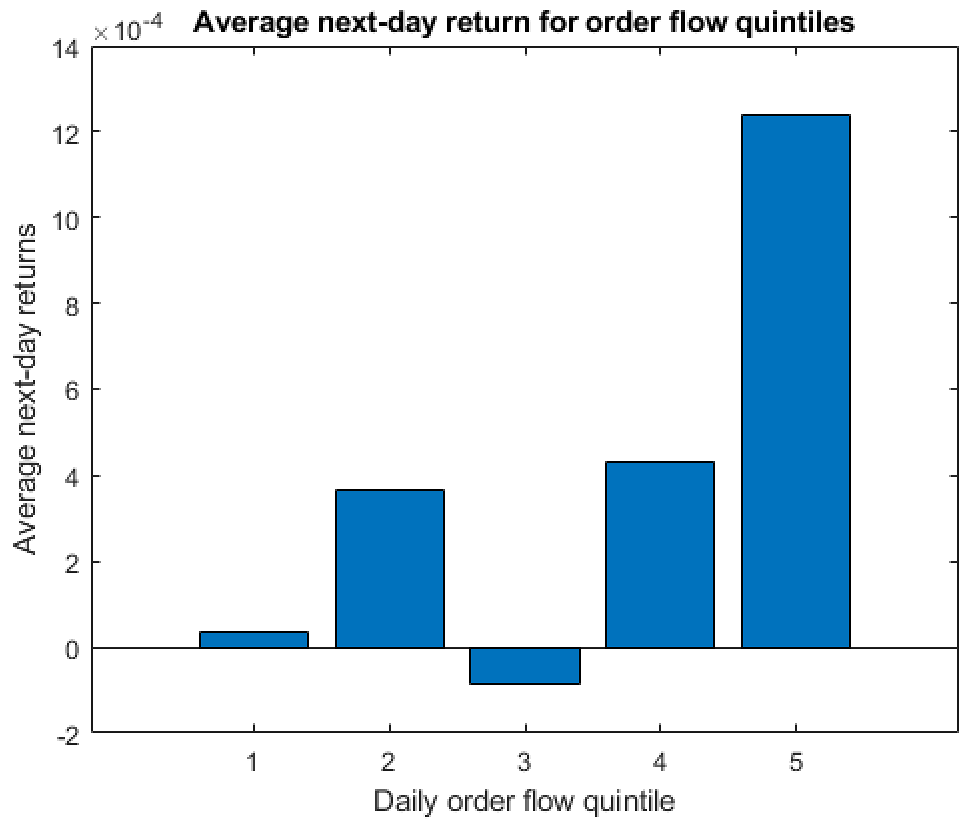
Data sanity check



Hourly variation of volume

- Highest volume between 15–16:00 London time.
  - 16:00 is the “fix” – benchmark rate is determined.
  - Much controversy due to possibility of rigging (FCA, USDOJ, EU investigations).

Returns vs order flow quintiles



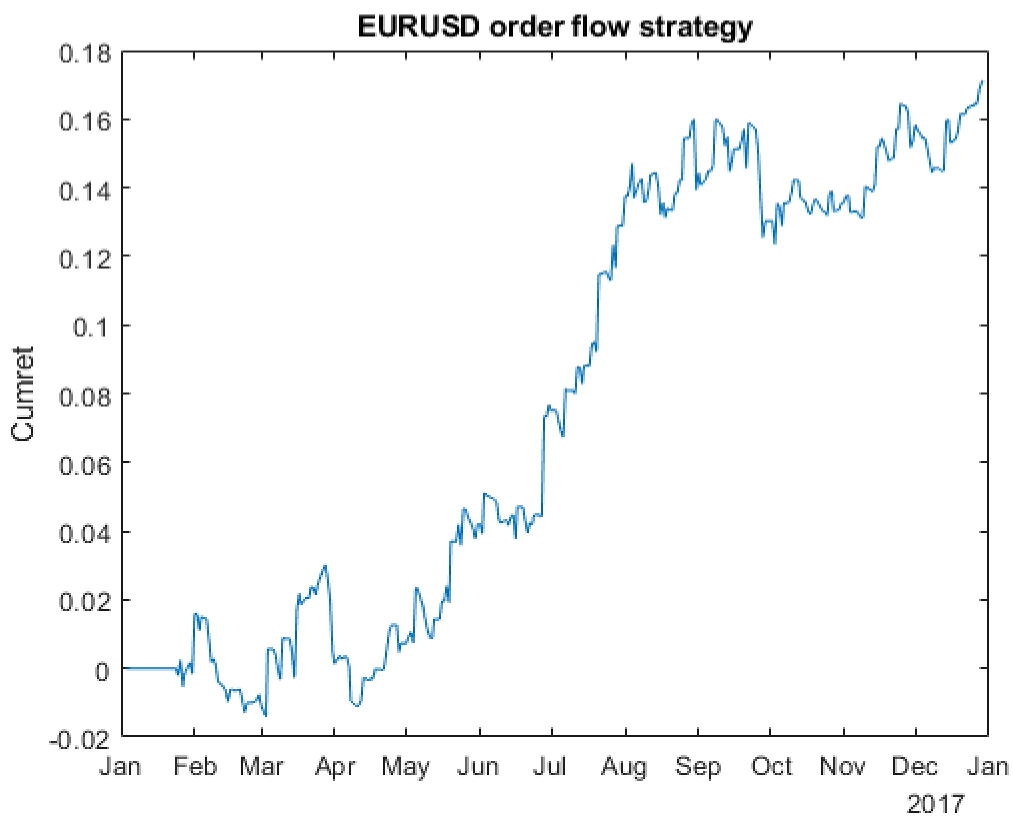
Next-day returns

- Next-day returns almost monotonically increase with previous day's order flow!
- Top-bottom quintile returns ~ 12 bps. (30% annualized.)
  - Does not mean we can obtain 30% returns per annum, as returns quintiles occur on different days.
- However, linear predictive model with order flow as predictor doesn't work well.
  - Common theme in trading: only extremes have alpha.

Time-series Strategy

- If aggregate order flow in day is in top quintile of last 20 days distribution: Buy and hold for 1 day.
- Vice versa if in bottom quintile.

Strategy Performance



Strategy Performance

- CAGR=13.7%
- Sharpe Ratio=1.6

Further work

- Study same pattern for different FX pairs.
- Study cross-sectional order flow trade
  - Rank daily order flow across all pairs.
  - Buy pair with highest flow, short pair with lowest.
- Study different lookback and holding periods.
- Backtest different years as data becomes available.

Order Flow for risk management

- Order flow will be very negative for risky assets (e.g. MXN, ZAR) if investors anticipate bad news, but very positive for low risk assets (e.g. USD, JPY, CHF.)
- Avoid buying *any* risky positions when such flows are very negative.
  - Risky positions would include equity indices, junk bonds, inverse volatility products, etc.

Live Trading

- Friedberg Direct’s technology provider, FXCM, provides a REST API.
  - Web-based API that makes use of a WebSocket connection.
  - Can retrieve historical data, real-time market data, place trades.
  - Calls can be made from any language that supports HTTP (e.g. Python, JavaScript).
  - Data in JSON format.
  - **https://github.com/fxcm/RestAPI**

Conclusion

- Order flow is well-known to be leading momentum indicator.
- Historically, hard to obtain in FX markets.
- FXCM now provides that as live data feed, and as historical data.
- Found to have predictive power over next-day return.
- Can be utilized as general risk indicator.

Keep in touch!

- Blog: epchan.blogspot.com
- Website: www.epchan.com
- Twitter: @chanep