# Forecasting short term yield changes using order flow: Is dealer skill a source of predictability?

Siri Valseth

Discussant: Bruce Mizrach

Department of Economics
Rutgers University

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# Market microstructure and asset pricing

There are now two well established links between asset prices and market microstructure:

1. The role that liquidity plays in determining the riskiness of financial assets. This has been demonstrated in the literature on the cross-section of stock returns by Pastor and Stambaugh (2003) and Acharya and Pedersen (2005).
2. Order flow effects short-term returns. This is a key stylized fact in foreign exchange, beginning with Evans and Lyons (1996). Brandt and Kavajecz (2004) have a related result for the U.S. Treasury Market. About 25% of Treasury returns can be explained by order flow.

Some of the interesting new results from Pasquariello and Vega (2010) or Underwood (2008) are that order flow in one instrument or market helps determine returns in another.

# Why order flow?

The benchmark Hasbrouck (1995) model has this feature,

$$r_t = \beta r_{t-1} + \theta x_t + \varepsilon_{r,t},$$

$$x_t = \gamma x_{t-1} + \varepsilon_{x,t}.$$

As long as order flow helps to predict order flow, it will have a lingering impact on asset returns. How big and how long is an empirical question.

This paper suggests that certain types of order flow $x_t^i$ might be either more persistent, $\gamma^i > \gamma$, or have greater market impact, $\theta^i > \theta$. It would be interesting (and in my view more convincing) to test this directly.

# New data for Norway

This paper utilizes some new data from the Oslo Stock Exchange from 1999-2005 which enables Siri to address these questions.

The data set includes all transactions in the benchmark bonds and the best bid and ask prices submitted by primary dealers.

# Types of trades

1. Dealer to dealer.
2. Customer to dealer.
3. Customer to dealer with delayed reports. These may be more informed.

# Principal components

Decompose forward rates into three principal components, $F_t^1$, $F_t^2$, and $F_t^3$.

These explain 99.9% of the variation in forward rates.

Lagged principal components contain no predictive power for changes in the yield curve though.

Brandt and Kavajecz (2004) find that order flow, depth and spreads constitute a distinct factor, and Siri incorporates order flow into her model.

# Predictive regressions

Encompassing model:

$$\begin{aligned} dy_{t+1}^{N} &= \beta_0 + \beta_1 FS_t + \beta_2^1 F_t^1 + \beta_2^2 F_t^2 + \beta_2^3 F_t^3 \\ &\quad + \beta_3^S OF_t^S + \beta_3^M OF_t^M + \beta_3^L OF_t^L + \varepsilon_{t+1} \end{aligned}$$

where we have short, $OF_t^S$, medium, $OF_t^M$, and long term, $OF_t^L$, order flow.

Under the maintained hypothesis, the order flow variables should have predictive power beyond the principal components. These are examined using daily and monthly yield changes and excess returns.

# Yield results: in sample

1. The order flow variables are significant and the principal components insignificant when they are included in the model. The results are stronger at shorter maturities. $R^2$ is highest for the 1-year at 2.8%.
2. Forward spreads maintain predictive power.

# Excess return results: in sample

1. Principal components remain significant when they are included in the model. The results are stronger at shorter maturities.
2. Forward spreads maintain predictive power.
3. Excess returns are more predictable than yields. For the 1-year 7.8% v. 2.8%.

# Out of sample

Consistently beats the random walk using the McCracken (2007) test.

# Economic significance

An increase in medium term order flow of 3.7 trades today will, all else equal, reduce the 3-year yield by 12 basis points tomorrow. My instincts tell me this is too large.

Accounting for the bid-ask spreads, can you make money here? What is the P&L for dealer initiated trades?

# Information in order flow

Consider order flow from delayed customer trades, $HCOF^i_t$ and the order flow orthogonal to that, $HCOF^i_{\perp,t}$.

The orthogonal component is highly correlated with the overall order flow, $corr(HCOF, OF) =$

| | $OF^S$ | $OF^M$ | $OF^L$ |
|---|---|---|---|
| $HCOF^S$ | 0.083 | | |
| $HCOF^S_\perp$ | 0.997 | | |
| $HCOF^M$ | | 0.114 | |
| $HCOF^M_\perp$ | | 0.993 | |
| $HCOF^L$ | | | 0.124 |
| $HCOF^L_\perp$ | | | 0.992 |

# Which order flow predicts returns?

The correlation matrix suggests that we may simply be replicating the earlier tables. But if not:

$HCOF_t^i$ is infrequently significant. Are we missing the informed trades using this proxy? or is the dealer selling (buying) into the informed buyers (sellers)?

$HCOF_{\perp,t}^i$ is the most important. Is this skill/effort as Siri suggests? or is this just the dealer trading in front of non-price sensitive traders? The fact that the daily results are stronger than the monthly results (where noise traders balance out) seems to support this.

# An alternative approach

I would prefer to see a system of equations, incorporating the different types of order flow

$$r_t = \beta r_{t-1} + \sum_{i=1}^{3} \theta^i x_t^i + \varepsilon_{r,t},$$

$$x_t^i = \gamma^i x_{t-1}^i + \varepsilon_{x^i,t}.$$

We could then determine which trades are more informative from the market impact,

$$\partial r_{t+j} / \partial x_t^i.$$

This would incorporate both the informativeness ($\theta$) and the persistence ($\gamma$) of the trades.

# Which dealers?

Only two dealers have predictive power at both daily and monthly horizons. Three dealers, one large and two small, have no forecasting ability, including the dealer with the largest customer base.

These two dealers are large and exert considerable "effort."

# Effort and skill

*Effort* or *skill* is measured as the value of a dealer's initiated interdealer trades relative to the value of her customer trades.

This ratio may indicate whether a dealer is actively collecting information in order to make profitable trades.

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This ratio may indicate whether a dealer is actively collecting information in order to make profitable trades. *I agree*.

# Effort and skill=prop desk

Effort/skill is measured as the value of a dealer's initiated inter-dealer trades relative to the value of her customer trades.

This ratio may indicate whether a dealer is actively collecting information in order to make profitable trades.

This sounds like the basic mission of a 21st century prop desk.

Siri's paper indicates that there are two active ones in Norway's bond market.