

MARKET ORDER FLOWS, LIMIT ORDER FLOWS AND EXCHANGE RATE DYNAMICS

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Background

- There is a contemporaneous correlation between market order flow and FX returns at all frequencies including macroeconomically relevant low frequencies
- Evans-Lyons established a theoretical basis for this based on dealers obtaining signals from their opaque customer businesses

Motivation

- Smart people use limit orders too (e.g. Kaniel and Liu, 2006 and Rosu, 2009)
- So shouldn't limit order flows be correlated with FX returns too?
- This paper creates a generalisation of the Evans-Lyons Model with a limit/market order choice problem for dealers

What do we do?

Theory:

- Embeds an order choice problem in the Evans-Lyons FX trading model;
- Requires a subset of dealers that do **not** have a significant relevant customer business and
- do **not** dispose of inventories immediately

What more do we do?

Predictions and Empirics:

- As in Evans-Lyons, market order flows move returns
- But inter dealer limit order flows also move returns but less so
- We take this to two years of order-level data on three FX pairs
- Limit and market order flows move prices in the right direction with the correct ranking of impacts

Theory 1

Two types of dealer

- A mean variance utility optimiser that has a reasonable customer business and thus must trade with the public. **Call them dealers**
- Other players in the inter-dealer market that are trading for reasons unrelated to customer trade. **Call them hedgers.**

Theory 2

Three trading rounds

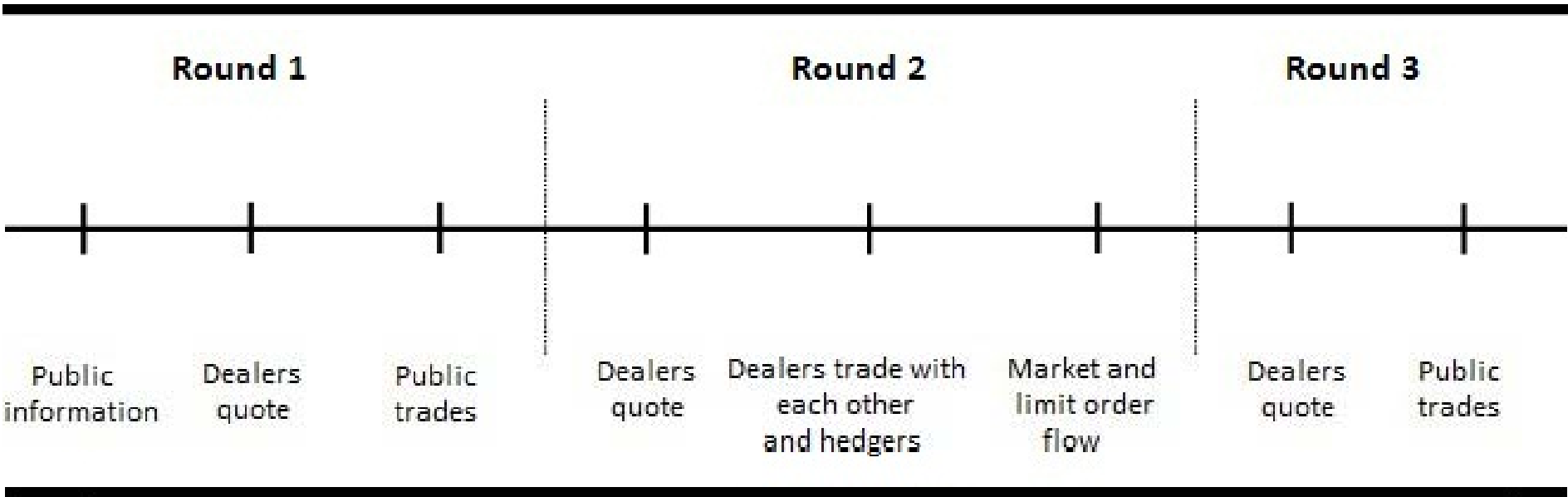
- 1. Customers trade with dealers:** dealers supply liquidity to the rest of the world
- 2. Inter-dealer trading:**
 - Dealers quote and trade via market orders amongst themselves
 - Dealers can post limit orders that may be executed by hedgers
 - Limit orders earn an exogenous spread if executed with execution probability fixed ex-ante.
- 3. Dealers *but not hedgers* pass off any final inventory to the public:** as public are risk averse, prices will need to adjust

Theory 3

How does the dealer choose his mix of limit and market orders?

- Treats limit and market orders as securities with differing risk/return characteristics and solves the resulting portfolio choice problem.
 - Limit orders have greater expected returns (as they earn the spread)
 - But limit orders have greater return variance (due to execution uncertainty)
- Thus a dealer optimally employs both order types

Intra-Day Sequence of Trading



What the Theory Predicts 1

We derive a unique closed form solution for PBNE

Dealers: use both limit and market orders

A. Market Orders increase in a dealer's original customer trade and decrease in the spread

- If the customer bought from you, you tend to buy
- If the spread is wide, you tend to use fewer market orders

B. Limit order quantities increase in the spread and in the customer's original trade

- If the customer bought from you, you tend to buy
- If the spread is wide, then you tend to use more limit orders

What the Theory Predicts 2

Prices:

- Increase in both aggregate market and limit order flows: both contain information about underlying customer flows
- Coefficient on market order flows larger than that on limit orders because executed limit orders are absorbed by hedgers not customers.

Model Limitations

- Exogenous spread and limit order execution probability
- Who are these hedgers?
 - They must be aggressive and have very little informative customer flow
 - They are hedging other positions or trading liquid currencies to facilitate positions in less liquid currencies
- There is no picking-off risk for the limit order traders in the inter-dealer market
- The payoff of these simplifications is that they give a form for price dynamics which can be taken to the data

Trading Data

- Tick by tick data from the Reuters trading system Dealing 3000
- Three currency pairs: EUR/USD, GBP/USD, and EUR/GBP
- January 2, 2003 to December 30, 2004
- Sampling frequency: hourly, daily (or higher if you want)

Results

- Market orders and limit orders significant and positive
- Limit orders have a lower price impact than market orders
- Price impact of market orders is much higher than under Evans-Lyons specification
- Works at all sampling frequencies
- Robust to instrumenting limit orders to allow for endogeneity

Conclusions

- Limit Orders are significant and add to Explanatory power
- The Evans-Lyons result on market orders is more important than we thought
- Theory and econometrics tell the same story