

Microstructure of Financial Markets:

HFT Regulation Structural Changes



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Definition of HFT

Characteristics	SEC (2010)	CFTC (2012)	IOSCO (2011)	ASIC (2010)	MiFID (2013)
Sophisticated computer programs	+	+	+		+
High message traffic	+	+	+	+	+
Low latency	+	+			+
Near-flat end-of-day net positions	+		+		
Short time frame for trading	+		+	+	+
Proprietary trading	+		+	+	+

HFT - fastest algorithms which generates large number of orders and trades with short holding period of positions.

Country	Order-to-trade ratio
Norway	70:1
Italy	100:1
Denmark	100:1
Finland	100:1
Sweden	100:1

For impact of regulation on EU markets see:

Kjell Jørgensen, Johannes Skjeltorp and Bernt Arne Ødegaard,
Throttling hyperactive robots - Message to trade ratios at the Oslo Stock Exchange,
Working paper 2014

Regulation of HFT in Russian

Additional fee from exchange (implementation date: 3 September 2012)

$$C = \max \left(\text{Numer of Orders} * \text{Liquidity} - \text{round} \left(\frac{\text{Sum}(\text{value of trades}) * F}{K} \right); 0 \right) * M$$

Liquidity ratio – 0.5 for market makers and 1 for other traders

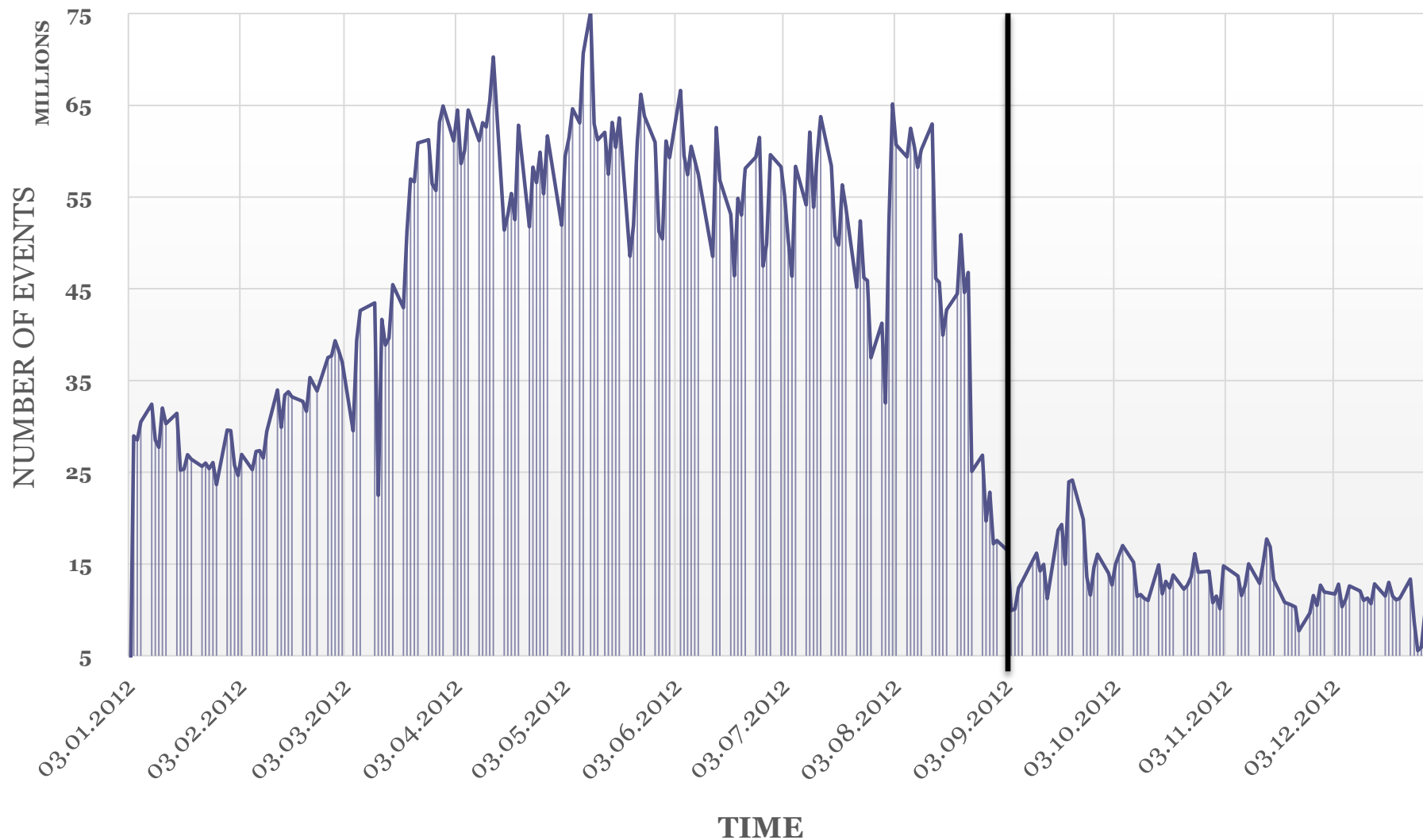
F – coefficient accounting commission and equal to 0.01%

K – coefficient accounting impact of reward and equal to 0.05

M - coefficient accounting cost for one order and equal 0.1 ruble

Changes in order flow

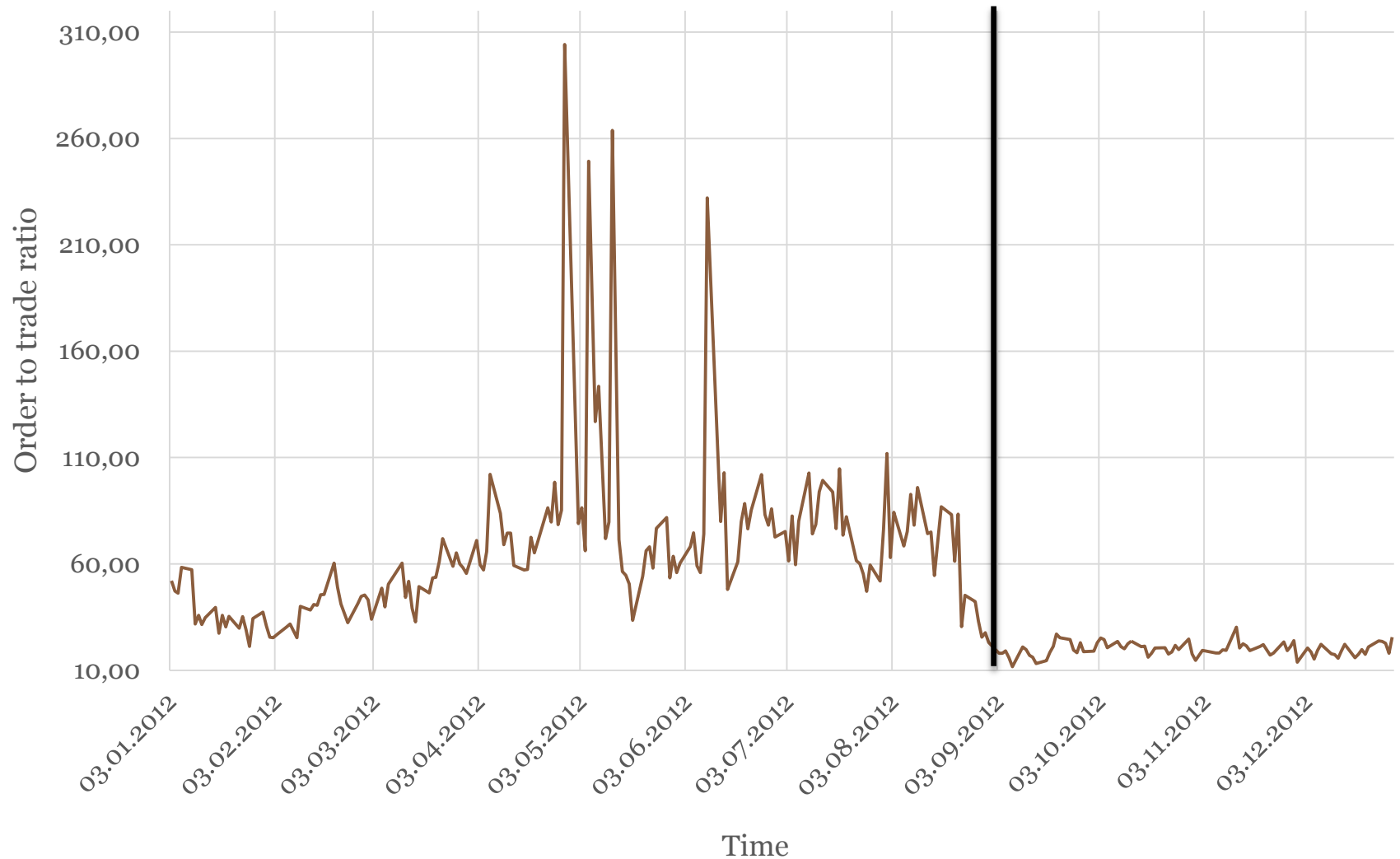
Events = all submissions+ all cancellations



Number of events from 1 Jan 2012 to 28 Dec 2012, MOEX exchange
(black line – day of implementation of tax)

Changes in order flow

Order to trade ratio = Number of orders / Number of trades



Dynamics of Otr per day from 1 Jan 2012 to 28 Dec 2012
(black line – day of implementation of tax)

Changes in order flow

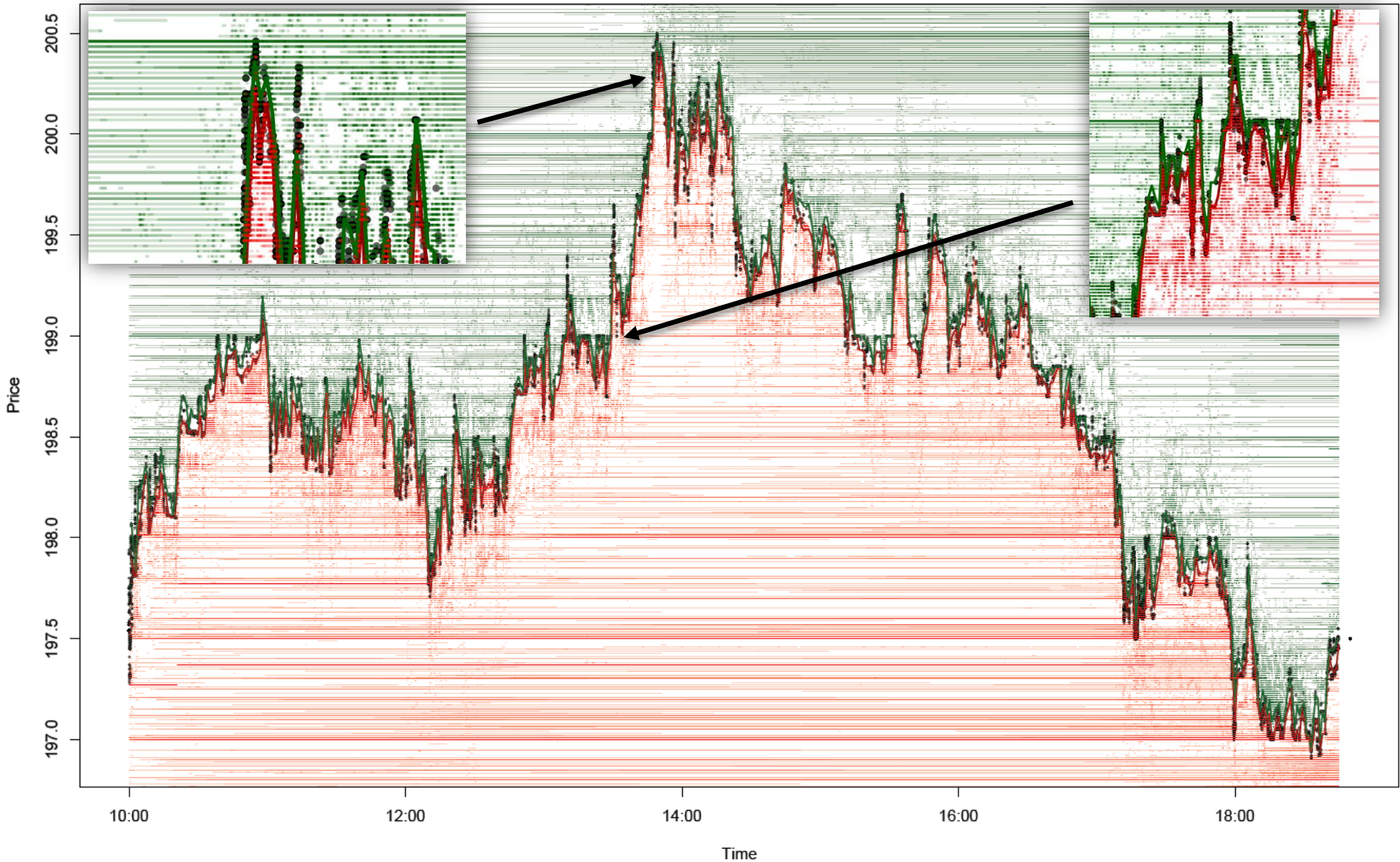
Cancellation ratio = Number of cancellations / Number of orders



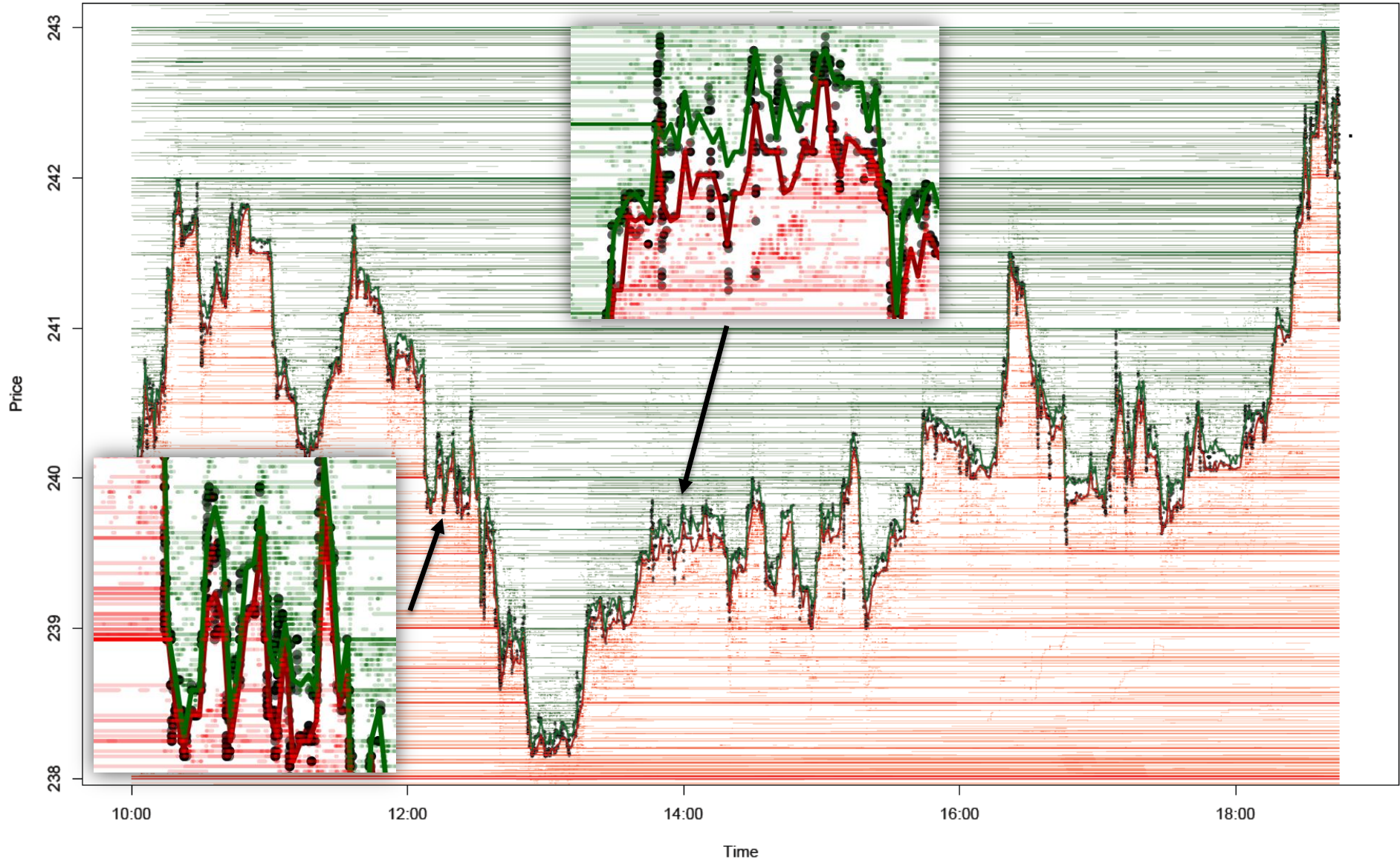
Dynamics of cancellation ratio from 1 Jan 2012 to 28 Dec 2012
(black line – day of implementation of tax)

Order flow visualization

Before implementation of tax
Intraday dynamic of stock Rosneft



After implementation of tax Intraday dynamic of stock Rosneft



Changes in order cancellation process

The price distance from the opposite best price at time t

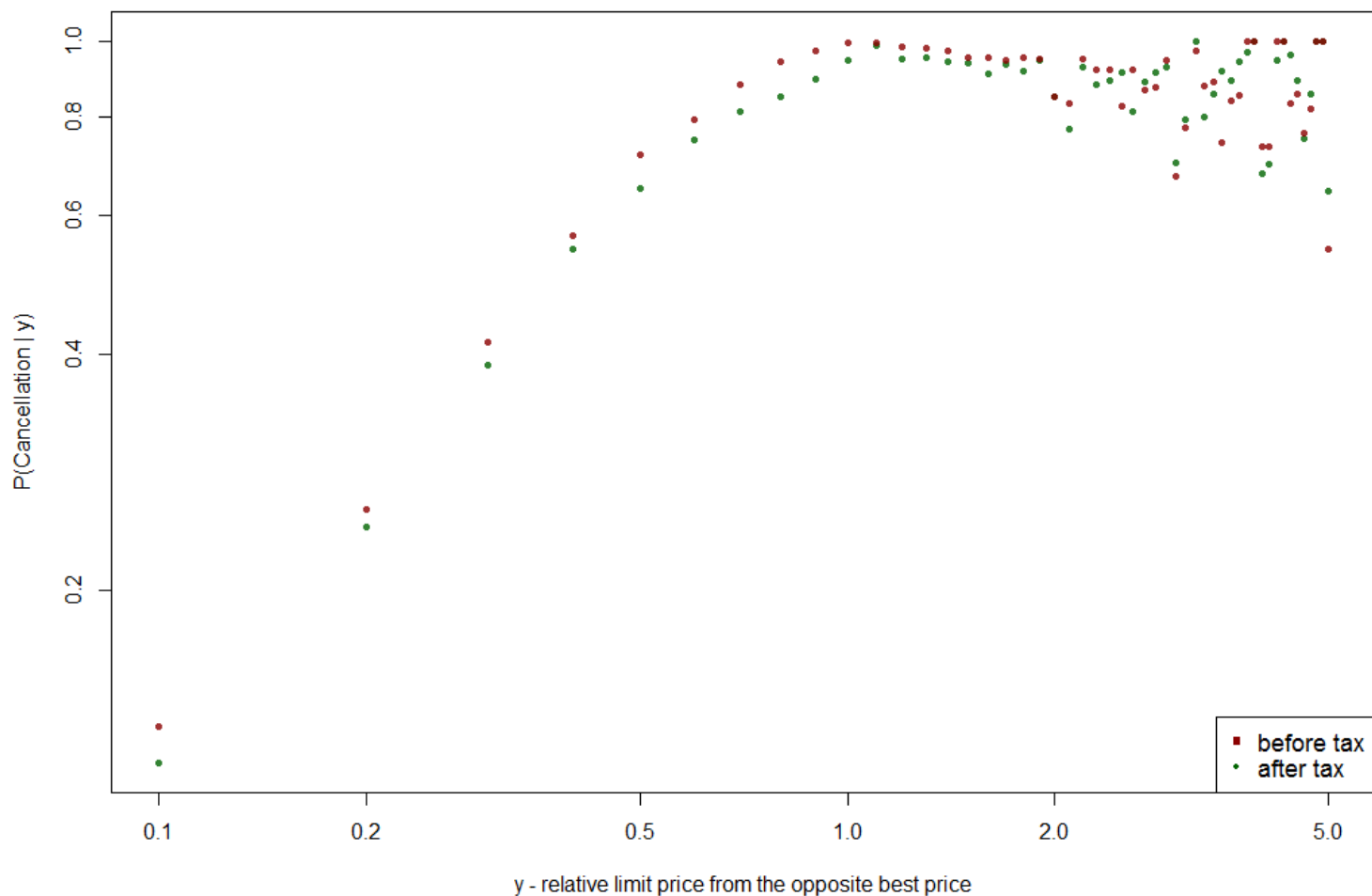
$$\Delta_i(t) = \pi - \pi_b(t) \text{ for buy orders}$$

$$\Delta_i(t) = \pi_a(t) - \pi \text{ for sell orders}$$

$$\text{Let's } y_i(t) = \frac{\Delta_i(t)}{\Delta_i(0)}$$

For more details of this metric see
Mike S., Farmer J. D. (2008) An empirical behavioral model of
liquidity and volatility, J. Econ. Dyn. Control 32

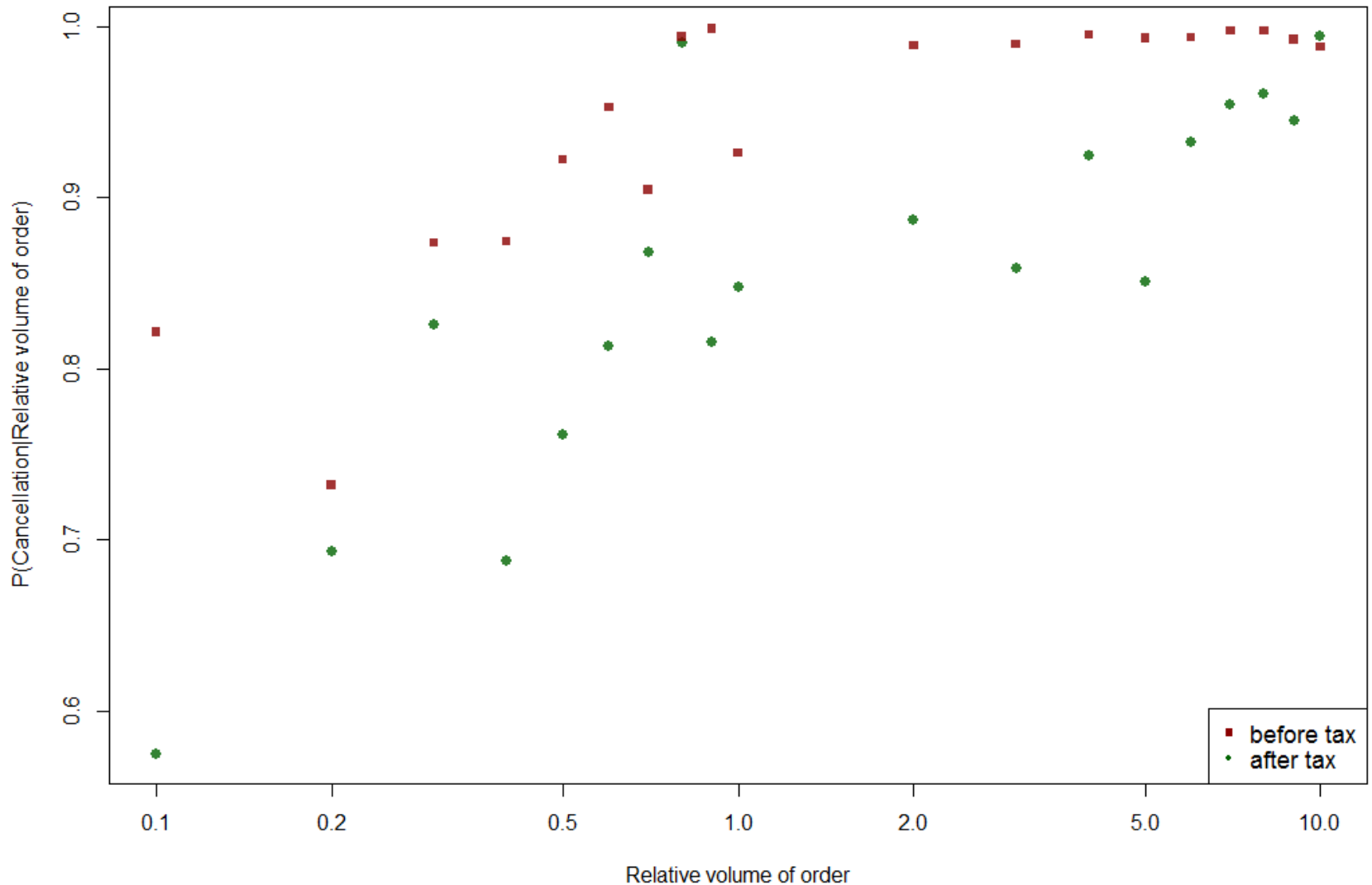
We calculated function for the whole Russian market:



Changes in order cancellation process

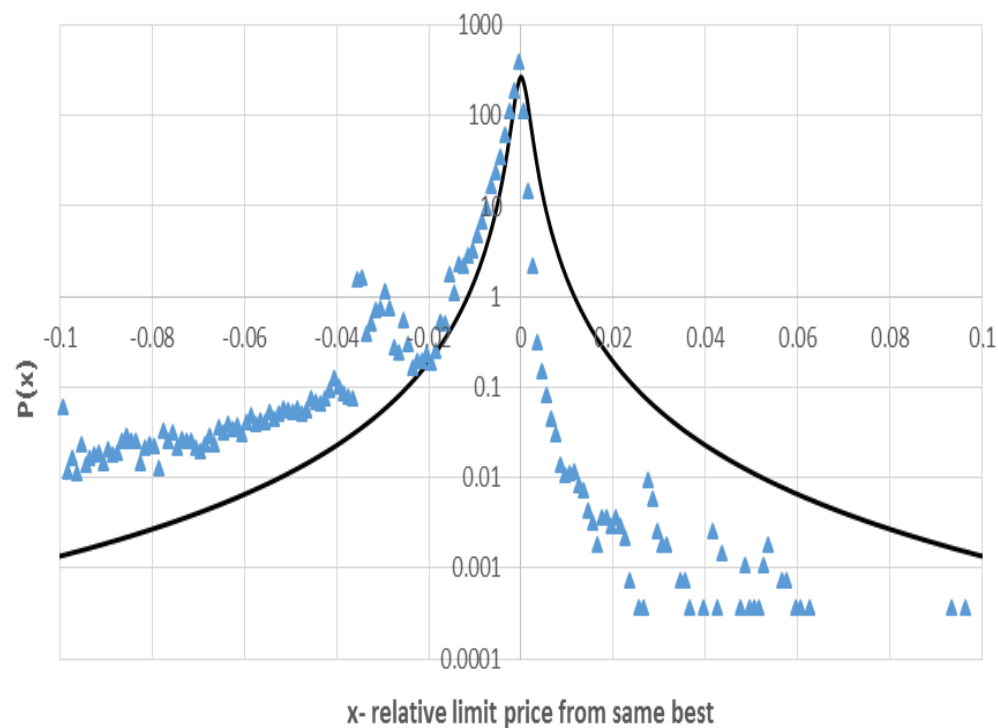
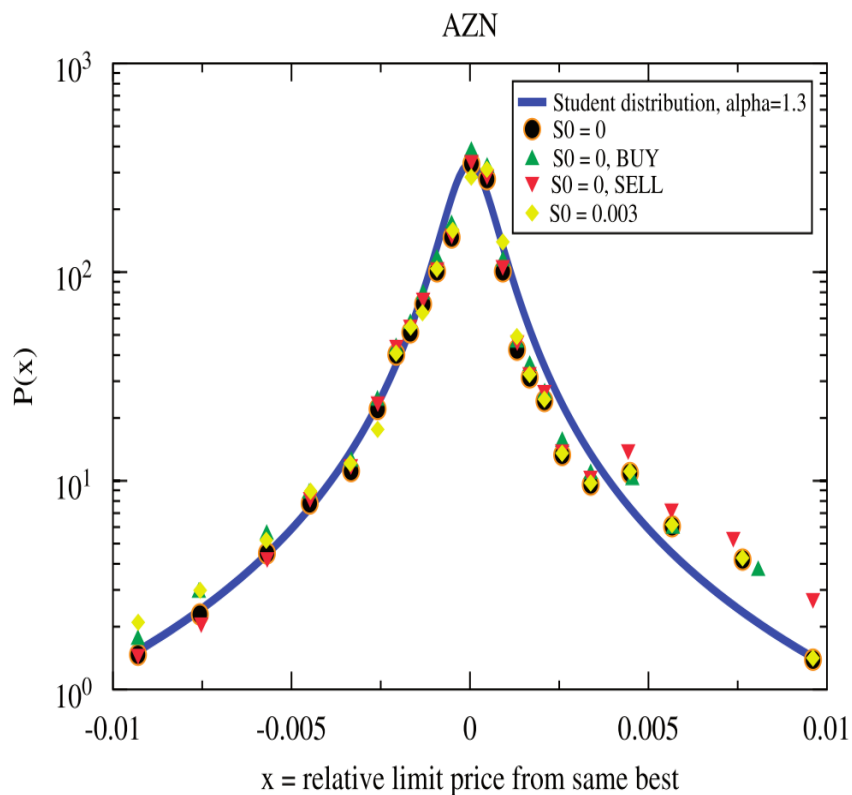
The relative volume of order calculated as fraction of current volume and volume of the opposite best price.

We calculated function for the whole Russian market:



Structural changes?

We compare price distribution of orders in London Stock Exchange in 2001 and Moscow Exchange in 2012 and find:

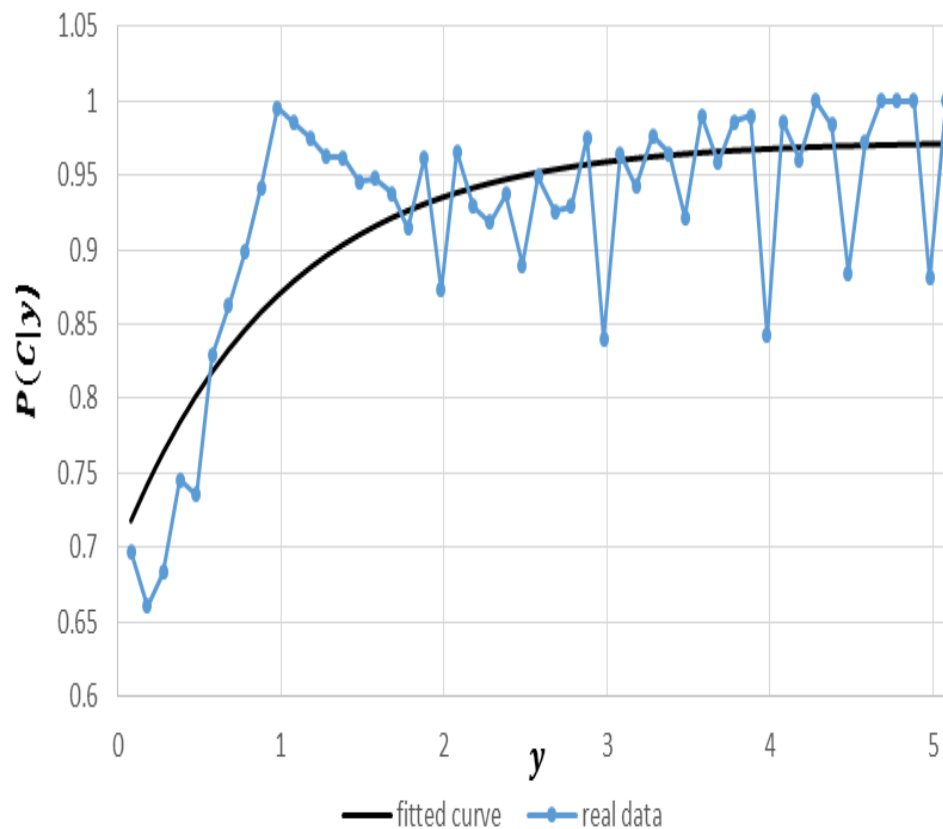
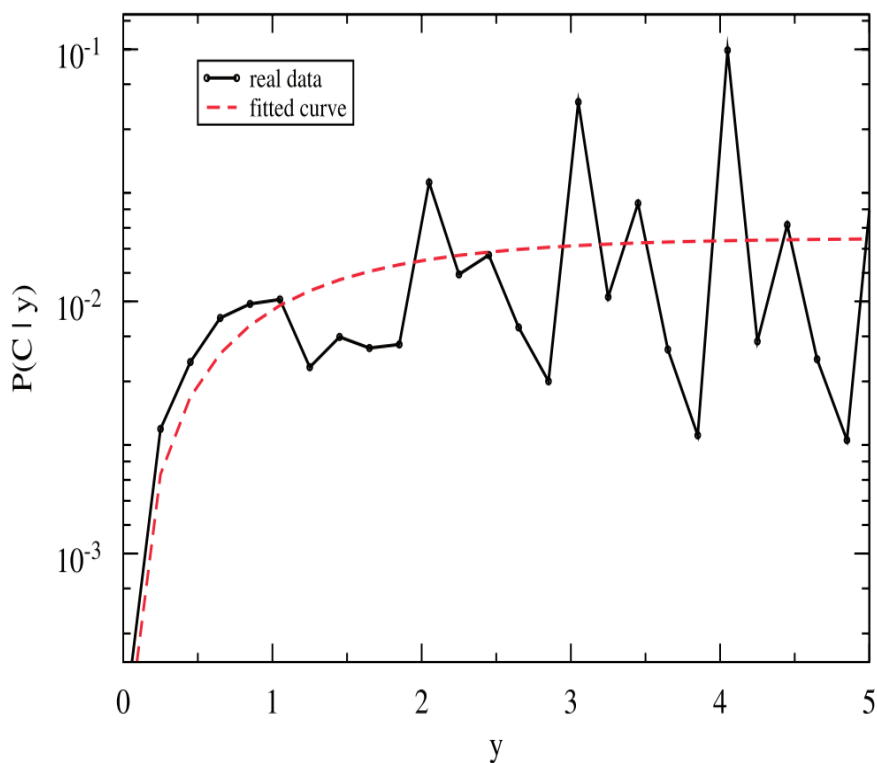


Empirical price distribution for LSE 2001 (left) and MOEX 2012 (right).
(Dark line – t distribution)

For more details of this metric see
Mike S., Farmer J. D. (2008) An empirical behavioral model of
liquidity and volatility, J. Econ. Dyn. Control 32

Structural changes?

We compare order cancellation process in London Stock Exchange in 2001 and Moscow Exchange in 2012 and find:



The probability of cancellation conditioned on position in the order book for LSE 2001 (left) and MOEX 2012 (right)

For more details of this metric see
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