Market quality and dark trading in the post MiFID II era: What have we learned so far?

Panagiotis Anagnostidis[1], George Papachristou[2], and Christos Varsakelis[3]

[1]*Institut Europlace de Finance (IEF) and European Financial Data Institute (EUROFIDAI), France*

[2]*Department of Economics, Aristotle University of Thessaloniki, Greece*

[3]*iMMC, UCLouvain, Belgium*

May 31, 2019

This research is co-financed by Greece and the European Union (European Social Fund- ESF) through the Operational Program «Human Resources Development, Education and Lifelong Learning 2014-2020» in the context of the project: “The role of dark trading in European capital markets: the case of BATS\CHiX Europe” (MIS 5005096)

Emails: Panagiotis Anagnostidis (panos@eurofidai.org), George Papachristou (gpapahr@econ.auth.gr), Christos Varsakelis (christos.varsakelis@uclouvain.be)

Motivation/Contribution

- Dark pools refer to the absence of pre-trade transparency
- Large (and smaller) informed investors can hide their trading intensions
- Fast investors (e.g., HFTs) take advantage of speed, co-location, and dark market opaqueness, profiting on the expense of slow traders
- Dark volume has been approximately 15%, 10%, 18% and 14% of total volume in US, Europe, Australia and Canada, respectively, in 2013 (Foley and Putniņš, 2016)
- Concerns about the effect of dark trading on market quality: Lit markets have become less efficient and less liquid. Need for greater transparency
- ESMA's response to these concerns:
  Double Volume Cap rule: Stocks with dark volume more than 4% (8%) on a specific (any European) venue, are suspended from dark trading for 6 months

Motivation/Contribution

- Related theoretical and empirical results are mixed:

  - POSITIVE EFFECTS: Dark pools increase competition for trade, while allowing for noise traders to be distributed among both lit and dark venues. Competition and fragmentation, in turn, lead to improved price discovery, price efficiency and liquidity (O'Hara and Ye, 2011; Jiang, McInish, and Upson, 2012; Foley and Putnins, 2016)

  - NEGATIVE EFFECTS: Dark pools attract noise traders, whereas informed traders migrate to lit venues (to increase execution probability), raising information asymmetry and the cost of trade (Zhu, 2014; Degryse, de Jong, and van Kervel, 2014; Comerton-Forde and Putnins, 2015; Buti, Rindi and Werner, 2011; Hathaway, Kwan, and Zheng, 2017)

- We examine, for the first time, the effect of the reduction of dark trading on lit market price quality, using the DVC rule as a natural experiment

Data and trading mechanisms

- Database: BEDOFIH
- Message by message history for securities trading on Chi-X (orders and trades)
- Sample: years 2017-2018
- Available flags: Dark trading, Iceberg order trading, Lit trading

Number of trades and total turnover in European markets in January 2016

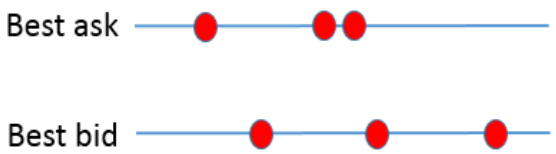
Market Operator	Trading Days	Trades	Turnover (EURm)
BATS/CHIX Europe	20	55,022,889	251,358.6
London Stock Exchange Group	20	27,962,000	189,029.0
Euronext	20	21,509,641	153,319.0
Deutsche Börse	20	13,408,804	113,283.1
SIX Swiss Exchange	20	4,351,599	72,480.9
BME (Spanish Exchanges)	20	5,154,394	71,813.1
NASDAQ Nordics & Baltics	20	10,362,384	57,989.0

Source: Federation of European Securities Exchanges (www.fese.eu)

Data and trading mechanisms

- Bids and offers submitted on the Chi-X platform should be within a 5% range with respect to the EBBO (European Best Bid Offer), calculated by the system (which is connected with a wide range of European electronic trading platforms), as well as within a certain range within the PBBO (Primary market Best Bid Offer)
- Chi-X operates two continuous order books: The Lit Order Book and the Dark Order Book
- Dark order book: trades are conducted at the midpoint price of the primary listing market (PBBO):

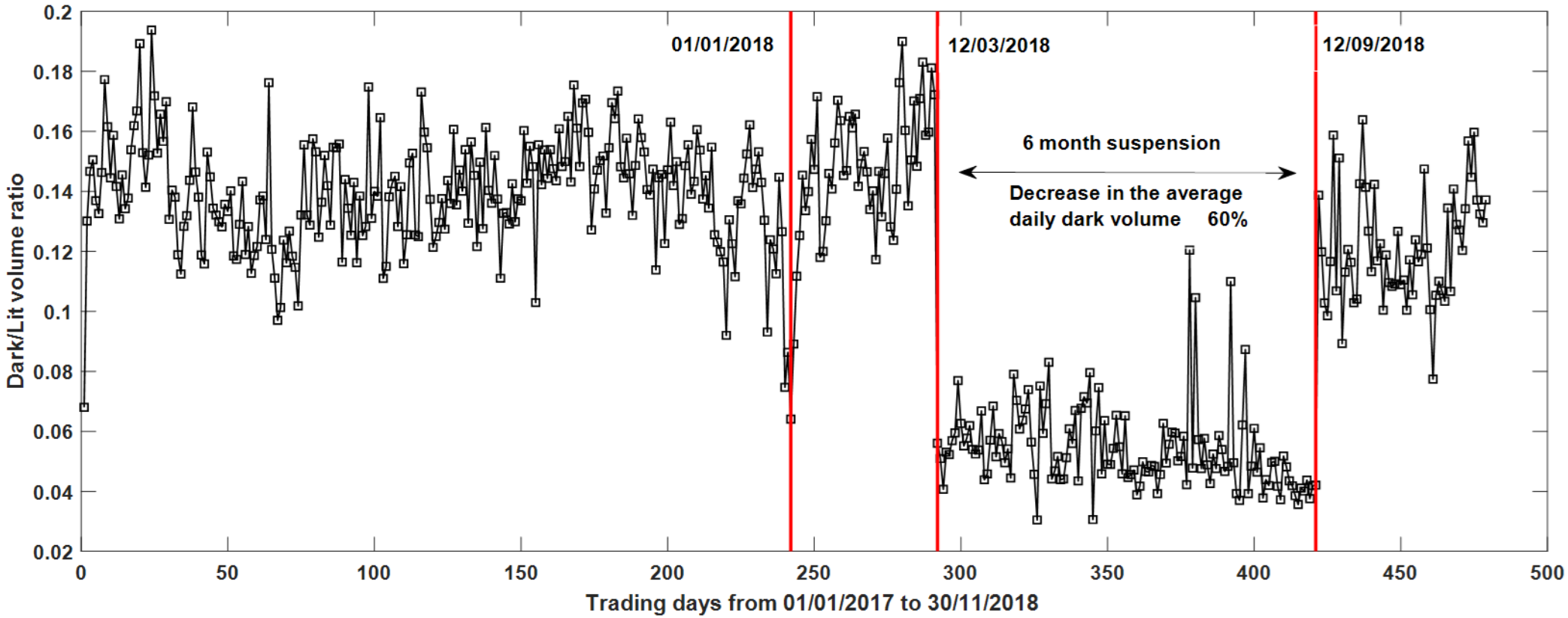
1) Bid-Ask dark trading:



2) Mid-point dark trading:

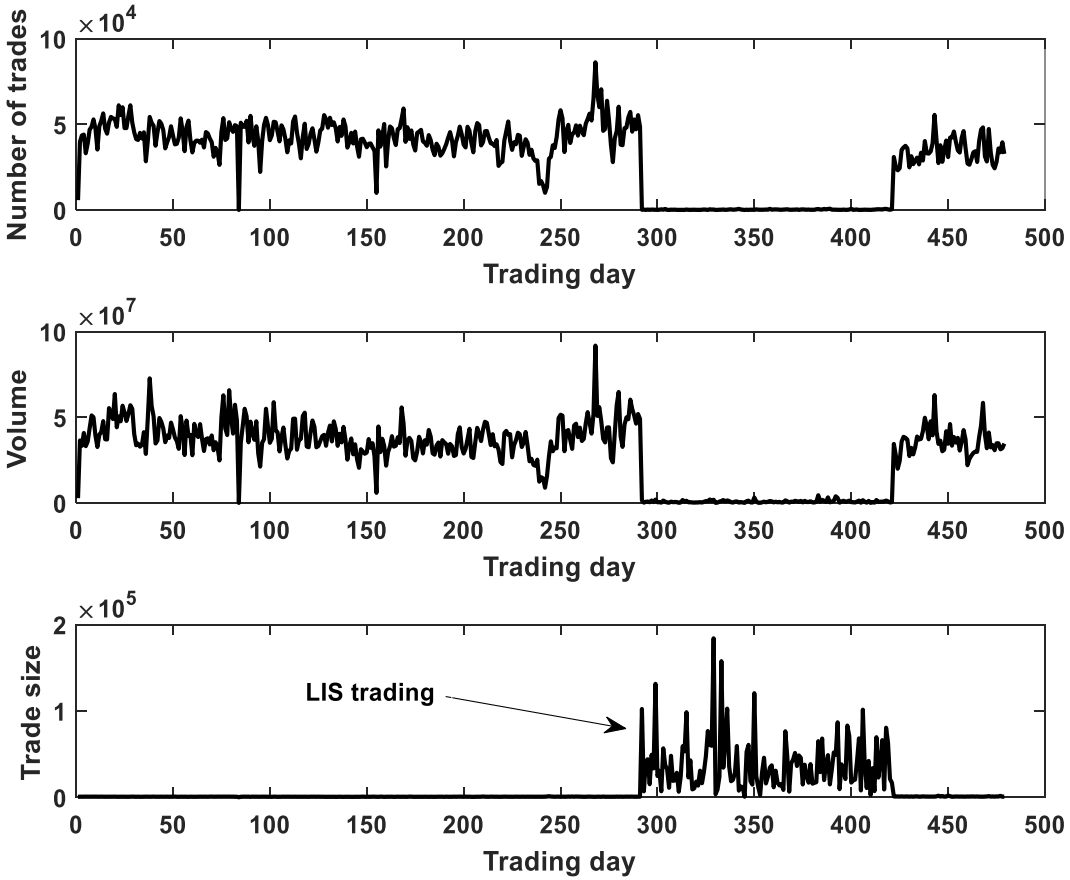
- Lit order book is typical: continuous double auction mechanism (bid-ask trading)

Evolution of the Dark to Lit volume ratio on Chi-X



- January 1, 2018: Start of MiFID II
- March 12, 2018: application of the DVC rule for a period of 6 months.
- Total securities in our data set: 7,856
- Identified securities suspended by ESMA (by their ISIN code): 700

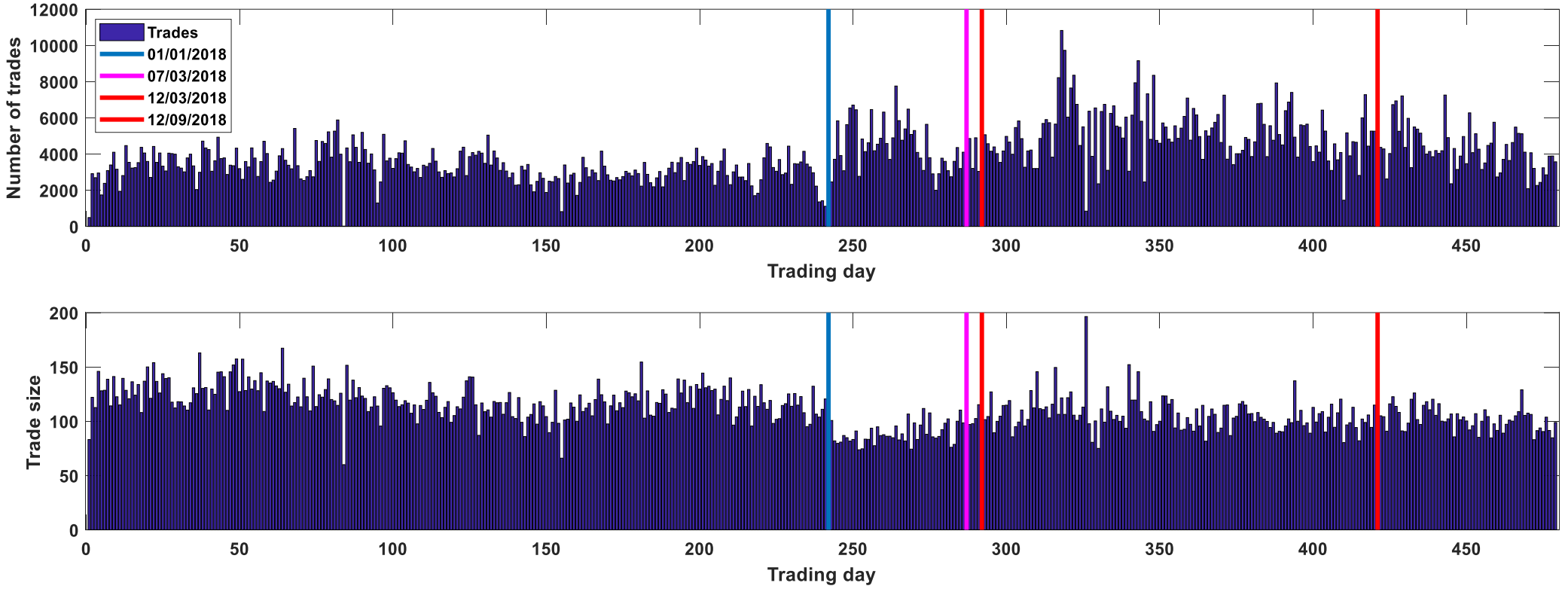
Suspended securities: dark book trading



- After the DVC rule, the number of dark book trades decreased dramatically

- **Dark trading alternative:** Large-In-Scale (LIS) waiver for large traders (not subject to the DVC rule) (attractive for informed investors who wish to keep trading in the dark)

Suspended securities: iceberg order trading



- Iceberg order trading on the lit central order book: ↑ **by 53%** (180 days before/after 01/01/2018)

- **Second dark trading alternative:** Iceberg order trading on the lit venue (typical for larger informed investors who wish to hide their advantage, and to reduce price impact)

Summary on dark trading

Dark trading alternatives after 12/03/2018, for suspended securities

Dark trading on the Lit Order Book:
- Iceberg orders

Dark Order Book:
- Large-In-scale waiver

Other (not in our data):
- OTC
- Periodic auction trading
- Systematic Internalizer

- **Our finding:** Traders have turned to alternative dark trading mechanisms, up to a certain extent
- Research question: What is the effect of the DVC rule on lit market price quality?
- ESMA's expectations:
  - Greater transparency (i.e., less dark trading) will improve lit market price quality (more efficient prices)
  - Dark trading suspension will push investors to lit venues, improving liquidity
- Theory predicts that:
  - The suspension of mid-point dark trading should lead to higher concentration of uninformed traders in the lit market, harming price discovery (Zhu, 2014)

Lit market price quality: volatility

- We examine volatility before and after 12/03/2018, the date of the implementation of the DVC rule)

- Let w a rolling window of N days in each of the two periods (e.g., Kempf and Mayston, 2008)

- For each rolling window, we estimate the realized variance (Comerton-Forde et al., 2018):

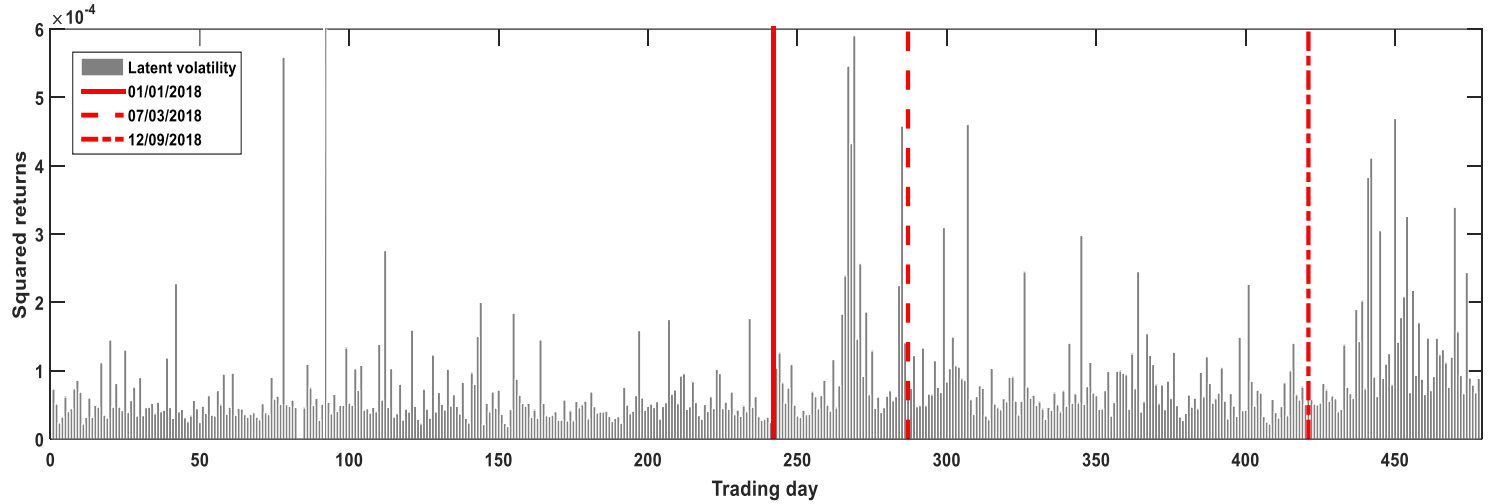
$$\mathrm{V_w} = 100 * \sqrt{\frac{T}{(N-1)} * \sum_{n=1}^{N-1} r_n^2}$$

N: is the number of days in the rolling window
T: is the number of days in the period
r_n^2: the daily squared logarithmic return

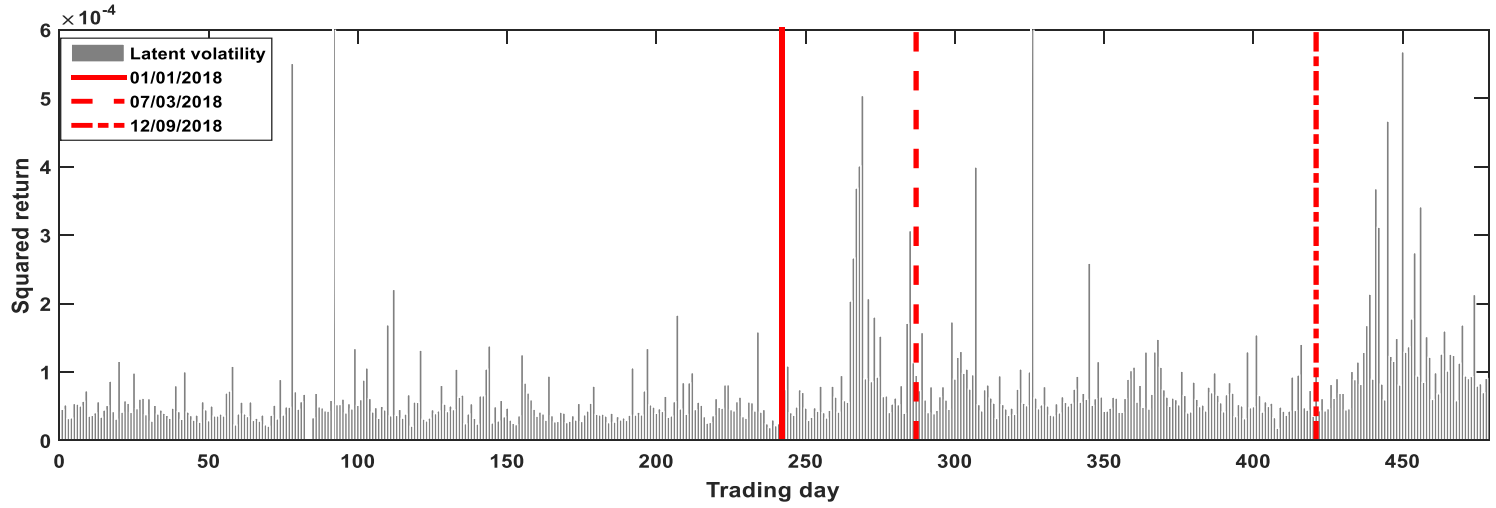
- We investigate the dynamics of volatility over a range of window lengths

Lit market price volatility (squared daily returns)

Not suspended



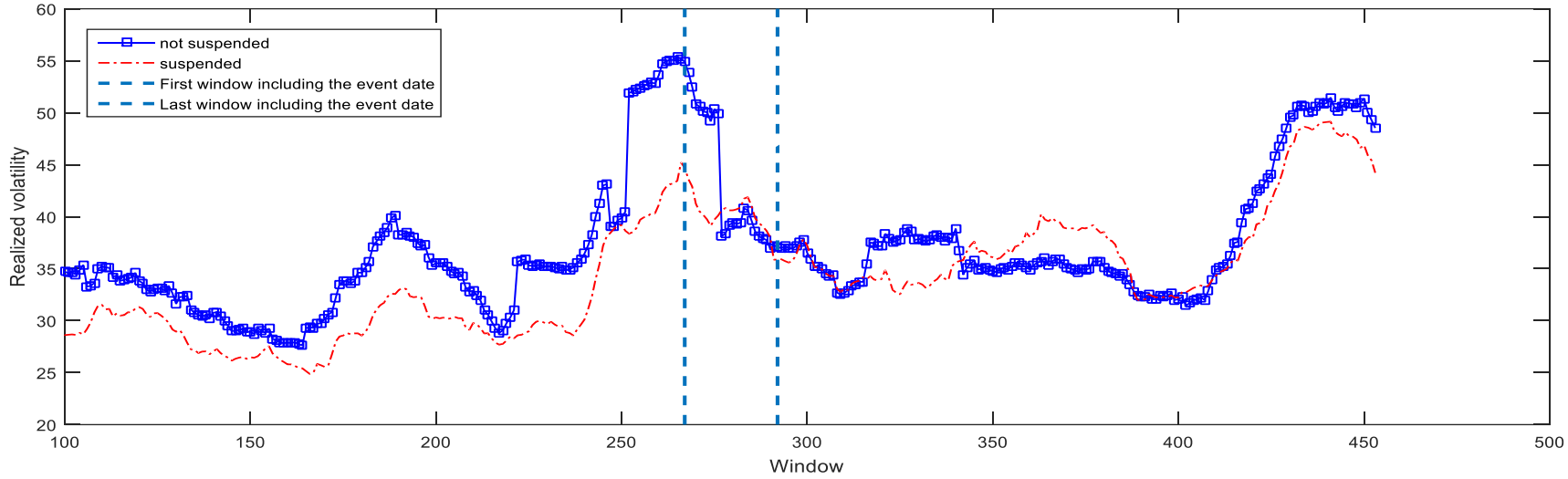
Suspended



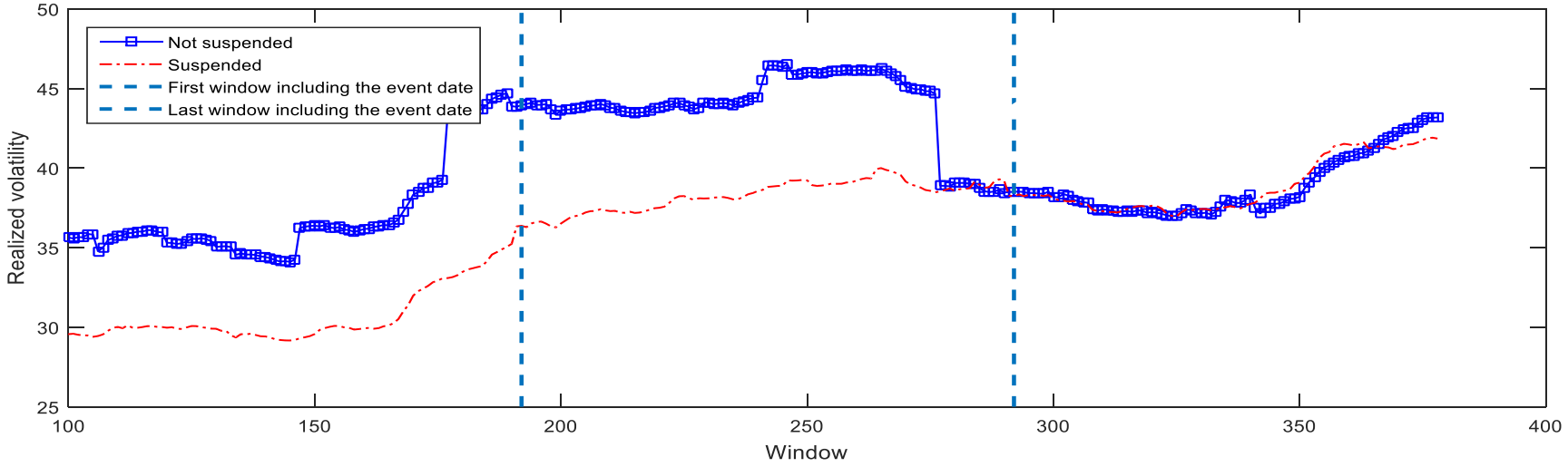
- Selected sample securities traded in Euros: 218 banned (439 not banned), after filtering for common currency and missing values
- Lit market daily squared logarithmic returns as a measure of volatility
- Market-wide volatility has increased around the event date, as well as after the suspension period, for both types of securities.

Lit market price volatility (moving averages)

N=25 days

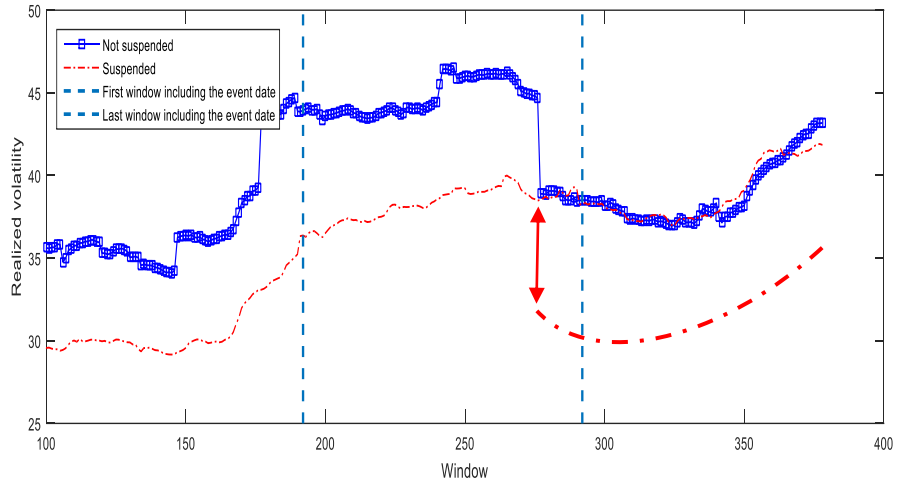


N=100 days

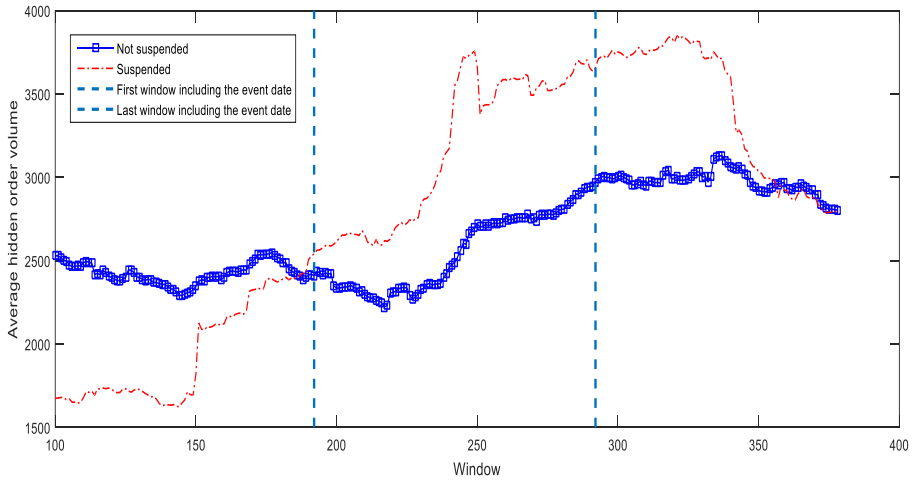


Lit market price volatility and Trading volume (N=100)

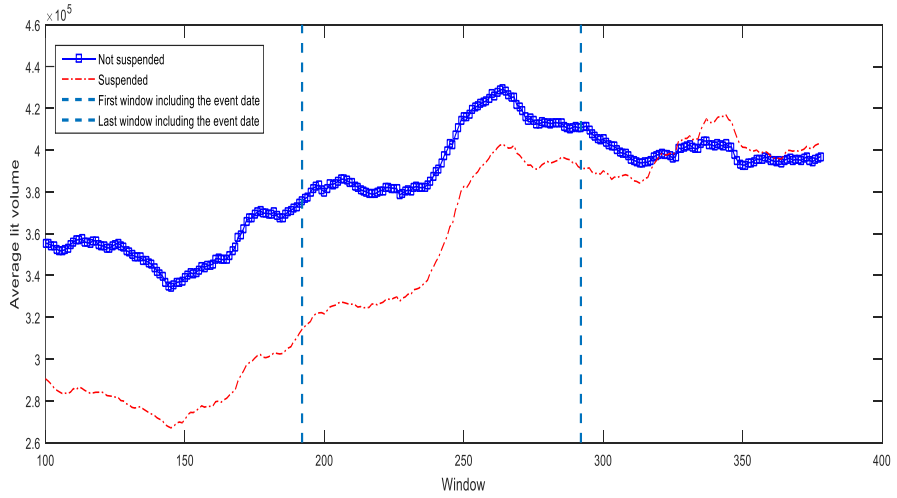
Volatility (Blue: not suspended, Red: suspended)



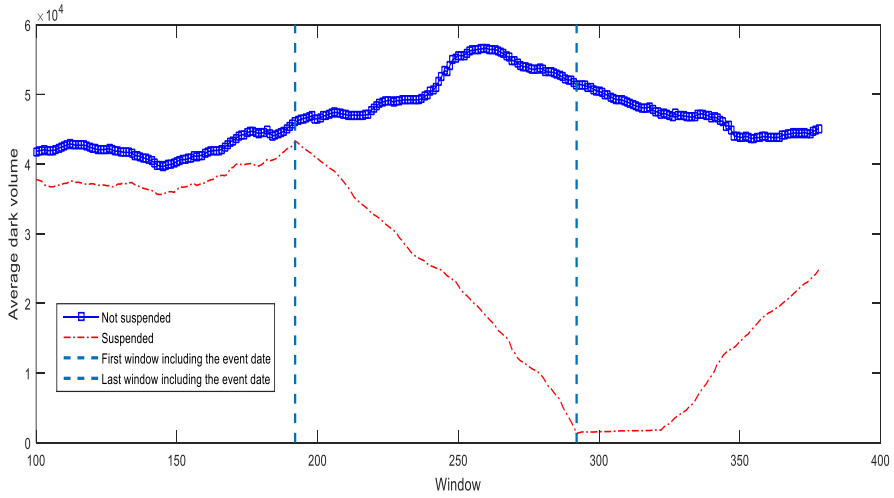
Hidden volume (Blue: not suspended, Red: suspended)



Lit volume (Blue: not suspended, Red: suspended)



Dark volume (Blue: not suspended, Red: suspended)



Lit market price volatility: diff-in-diff approach

❑ $Volatility = a + b * treat + c * time + d * (treat * time) + \mathrm{e}$

- $time$ is a dummy variable taking values 0 (1) before (after) the event (12/03/2018)
- $treat$ is a dummy variable taking values 0 (1) for securities not suspended (suspended)
- $treat * time$ is the interaction between $time$ and $treat$ (i.e., the difference-in-differences estimator)
- $Volatility$ is realized variance (divided by 100)

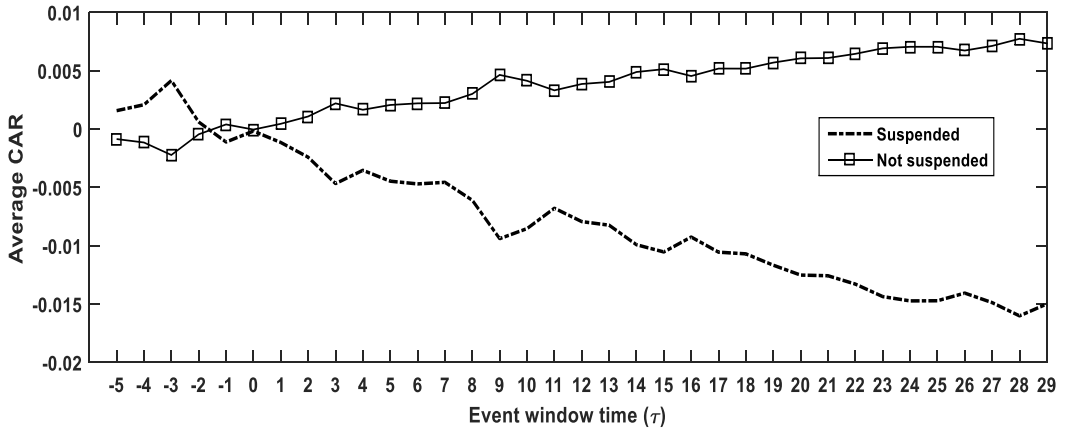
Coefficient	Estimate	t-statistic
a	0.407932	232.1692
b	-0.01939	-8.42302
c	-0.06328	-30.114
d	0.063721	21.91299

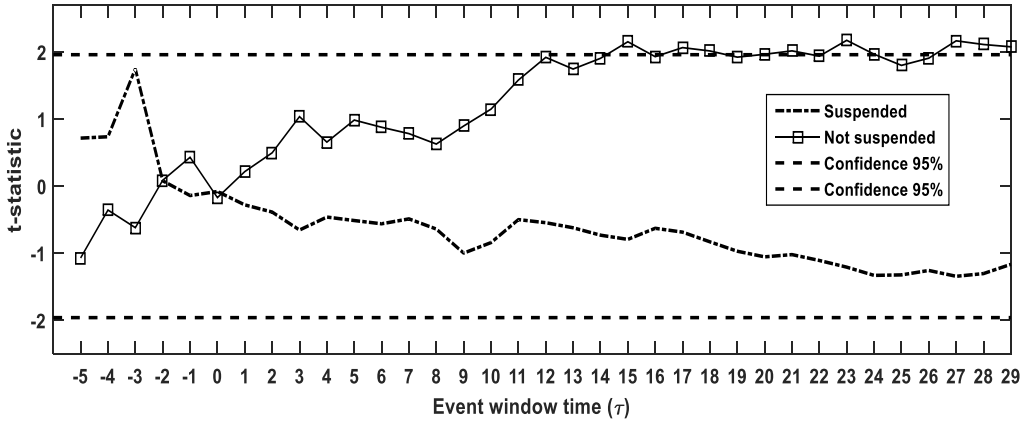
❑ **Causal effect of the DVC rule on lit price volatility for the treatment group (suspended securities): ↑**

❑ Robustness: Filter for market-wide volatility, $Volatility_i = \alpha_i + \beta_i Volatility_M + \epsilon$, and use ϵ in the diff-in-diff regression as dependent variable (results very similar)

Lit market price efficiency: event study approach

- Estimation window: 2017
- Market model benchmark: $R_{i,t} = a_i + b_i R_{m,t} + e_t$, $t = 1, \dots, 237$ trading days (in 2017)
- Event window start: 07/03/2018 (announcement of suspended securities by ESMA), at time τ=-5
- Event time (τ=0): 12/03/2018 (start of the DVC rule).
- Abnormal returns: $AR_{i,t} = R_{i,t} - (\hat{a}_i + \hat{b}_i R_{m,t})$
- Selected sample securities traded in Euros: 218 banned (439 not banned)
- t-statistics for CARs are calculated as in Kolari and Pynnönen (2010) to account for cross-correlation





- **Not suspended securities were (gradually) positively evaluated by investors (undervalued by the benchmark model)**
- **Evidence is against price efficiency (under-reaction of investors)**
- **Opposite trend for suspended securities, but not significant at the 5% probability level**

Conclusions

- Our study is motivated by recent concerns regarding the adverse effects of dark pools on lit market price quality: need for more transparency and improved liquidity in lit venues
- We investigate market price quality before and after the implementation of the DVC rule, which suspended dark trading activity for a fraction of European securities, within the MiFID II framework
- A certain percentage of investors have turned to alternative dark trading mechanisms, such as the LIS waiver and iceberg order trading.
- The DVC rule has succeeded in pushing a certain dark volume fraction toward the lit market. However, this externality has significantly increased lit price volatility for suspended securities.
- Investors have positively evaluated securities that were not suspended.
- Future work: expand our paper on liquidity