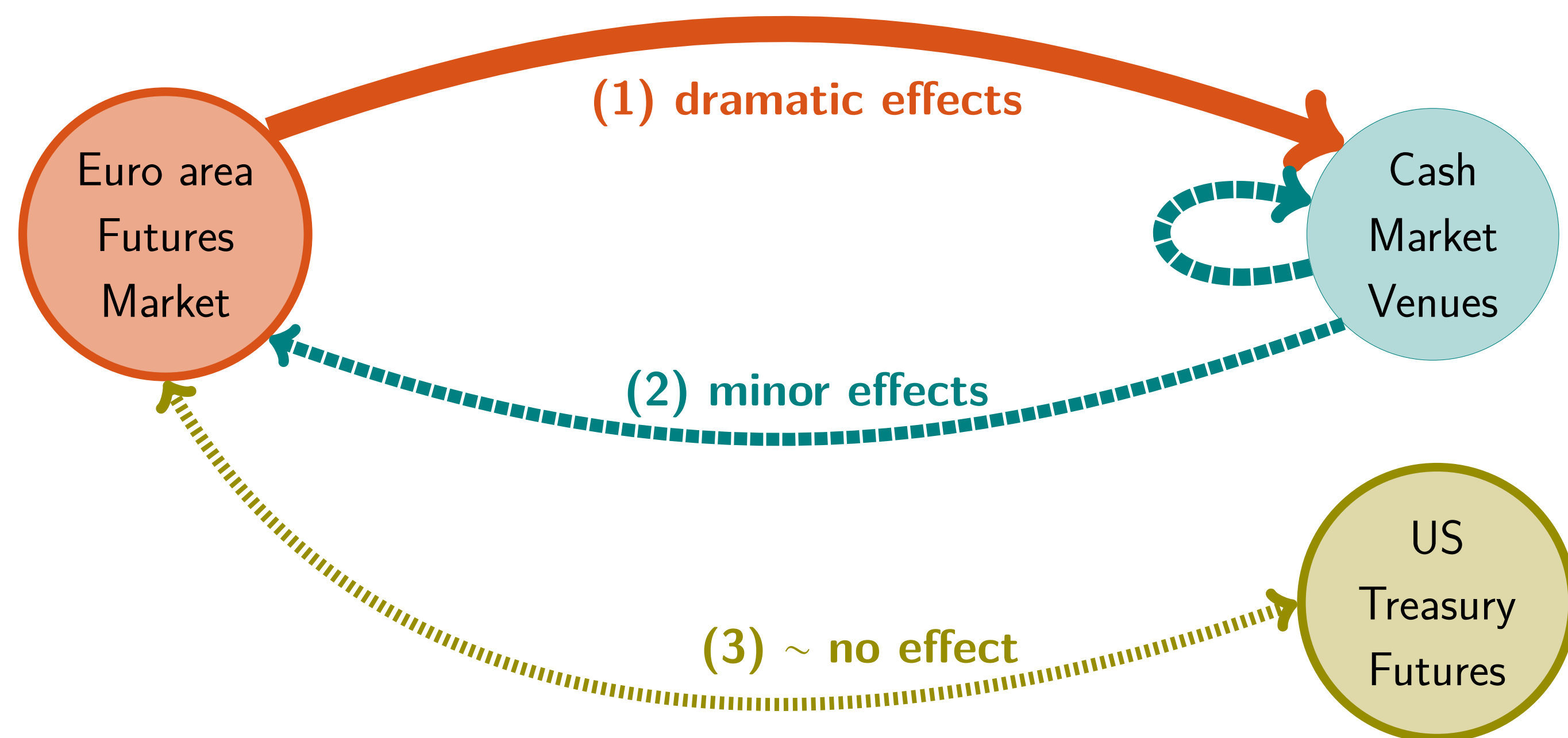


Macro-level effect of outages



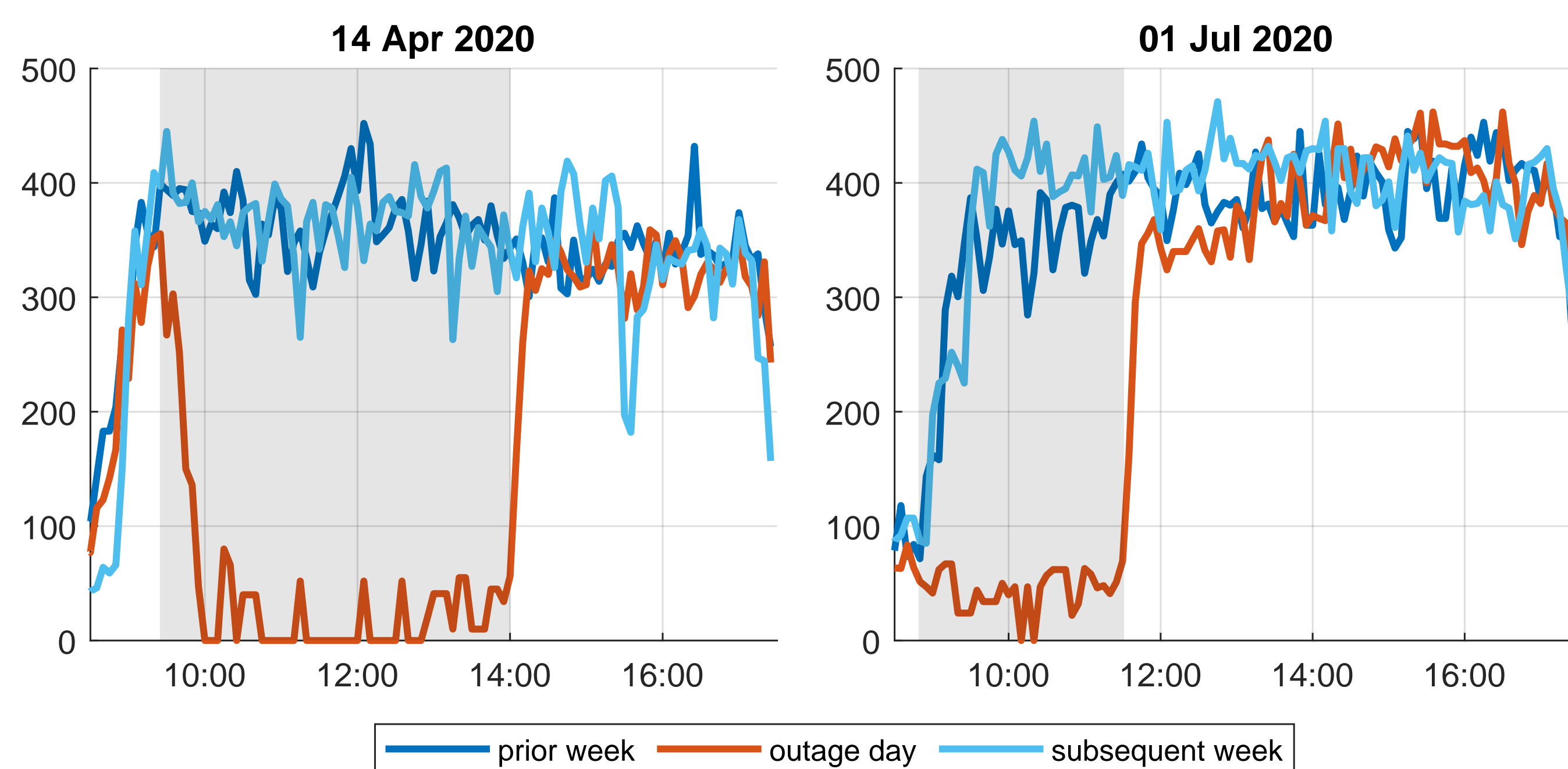
based on 14 Eurex outages between 2009-2020

MTS outage in 2010/2019, Bloomberg 2015, FWB 2015, Brokertec 2019

6 CBOT outages in 2006-2007 and CME outage 2019

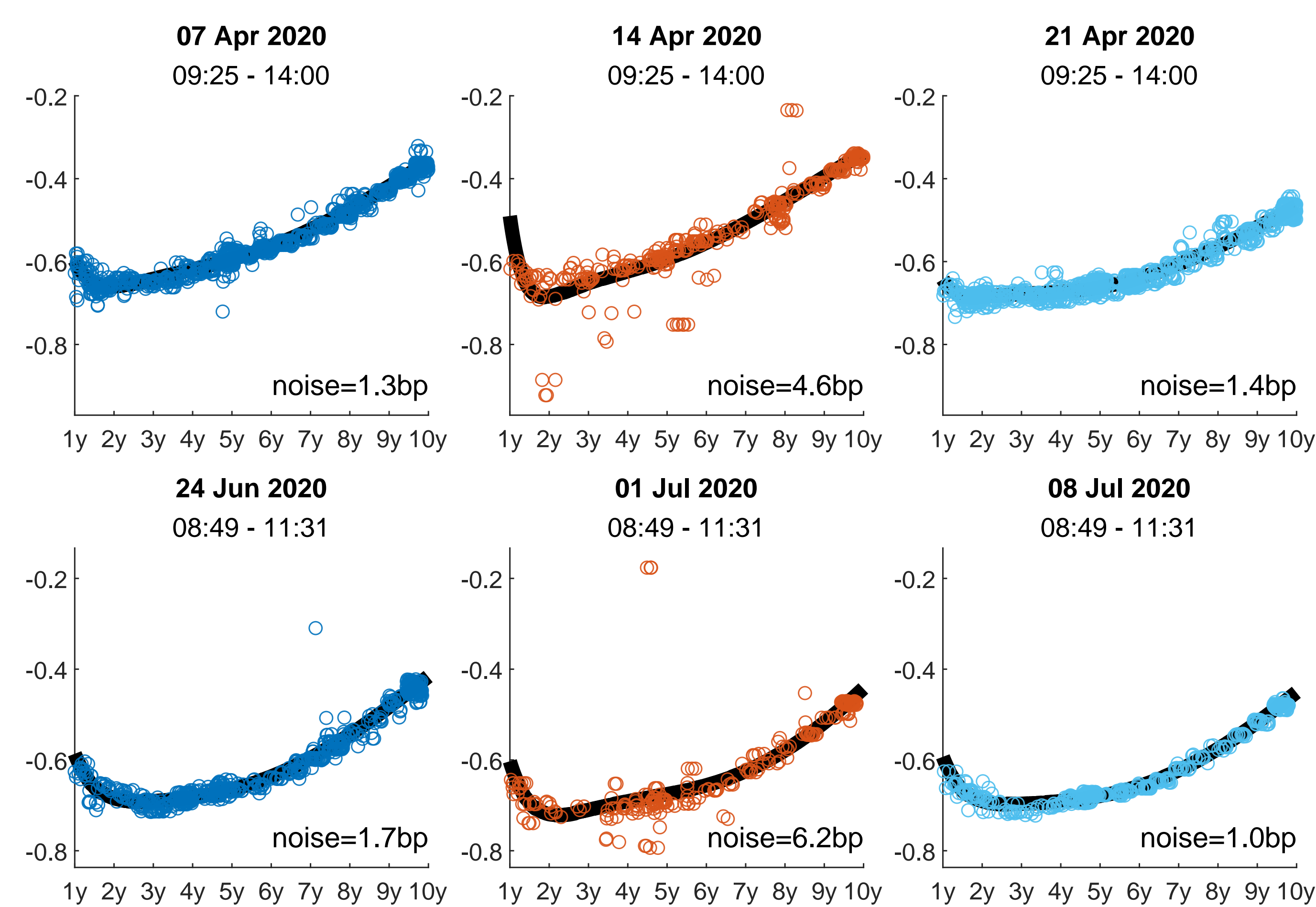
(1) when the futures market goes down ...

... trading on cash market stalls, liquidity evaporates:



Order book depth in million € on MTS in German, French, Italian and Spanish CTD bonds.

... and prices deviate from fundamentals:



Actual transaction yields of 1y-10y German bonds vs fitted yield curve. Noise refers to the root mean squared pricing error, see Hu et al. (2013).

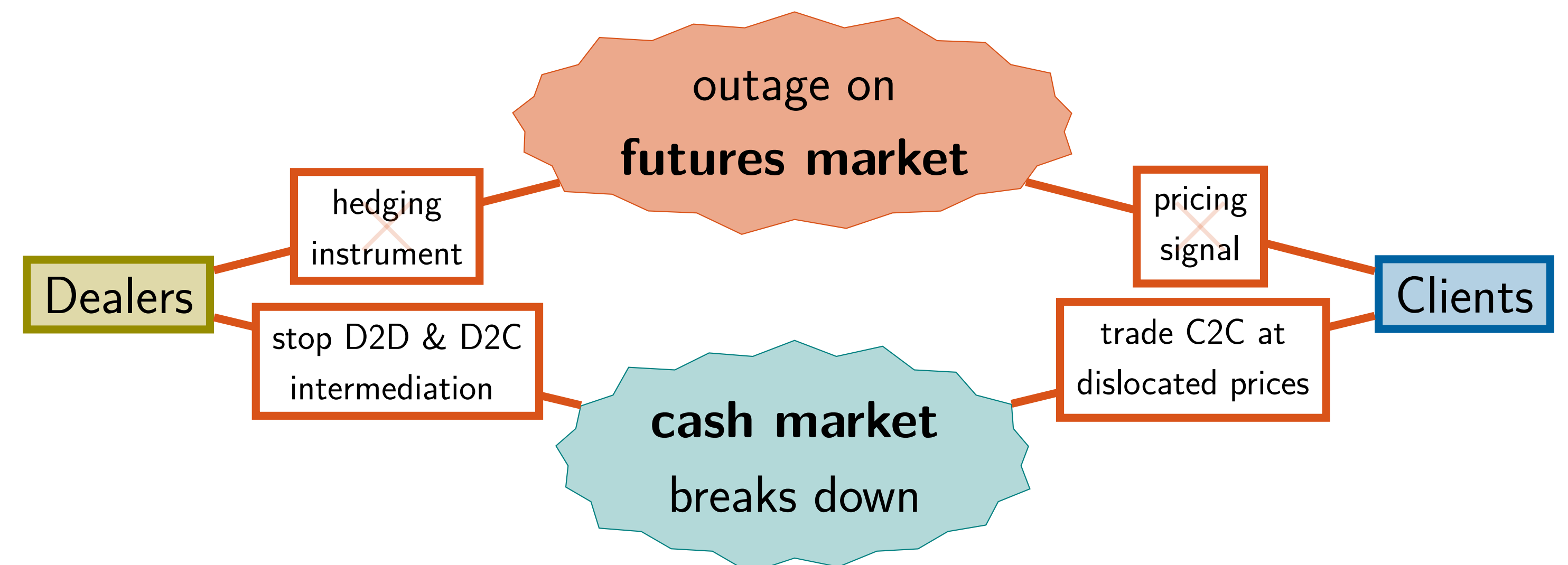
(2) when individual cash venues go down

- aggregate cash market trading volume ↓
→ imperfect substitution between venues
- futures market trading volume ↓ slightly
- but market functioning barely affected (volatility, Amihud, Roll)

(3) no spillovers of US/EA futures market outages

Micro-level mechanisms

(1) futures market outages



- trading ↓ most for D2D and least for C2C segment
- mispricing ↑ most for C2C and least for D2D trades

HHs > Investment Funds > Banks

non-dealer banks > dealer banks

only HHs consistently incur losses, other mispricings "net out" at investor-category-level

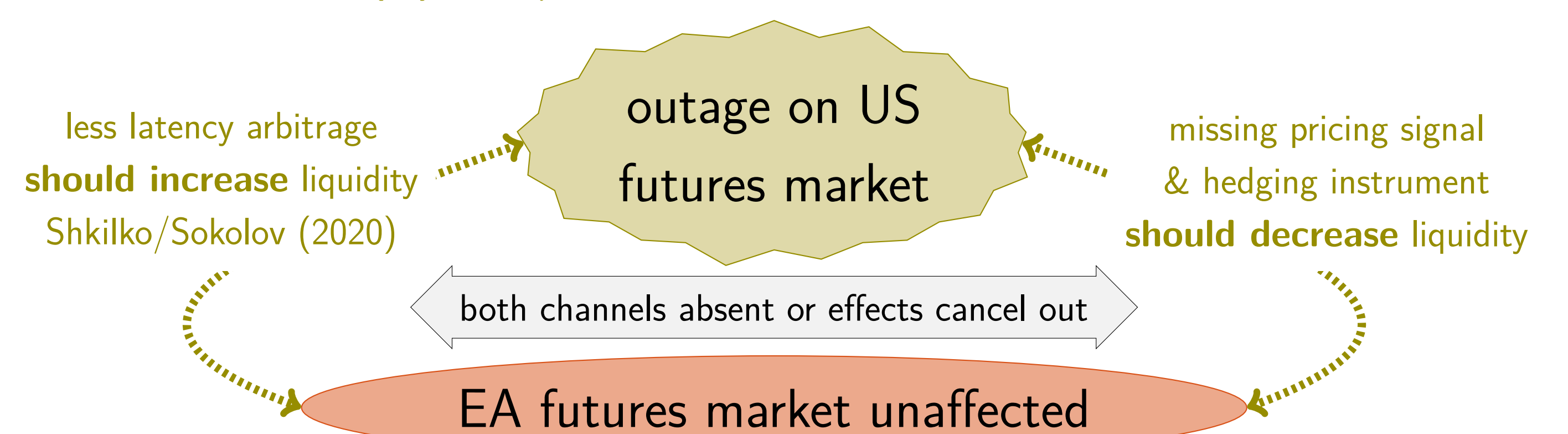
Dealer vs. Client dichotomy also explains

- why mispricing ↑ for small trades in short-term, non-CTD bonds
- why mispricing ↑ for bilateral OTC trades, on electronic platforms and regular exchanges, than on single dealer platforms or via D2D brokers
- trading volumes and liquidity drop *more* but pricing errors increase *less* for long-term bonds

(2) cash venue outages



(3) US/EA futures market outages



Summary and Conclusions

outages as natural experiments

unanticipated and exogenous shocks, rare glimpse into market functioning

bond futures are vital for cash market

as hedging instrument (dealers) and pricing signal (clients)

asymmetric outage effects

price discovery and liquidity provision a one-way street (futures → cash)

no liquidity spillovers between US ↔ euro area

in contrast to strong price spillovers documented in the literature