

The Propagation of Shocks Across International Equity Markets: A Microstructure Perspective

Dion Bongaerts, Richard Roll, Dominik Rösch, Mathijs van Dijk,
and Darya Yuferova

Rotterdam School of Management, Erasmus University
California Institute of Technology

18th December, 2014

Motivation (1)

- During past decades intensification of the globalization process took place, so now financial shocks can spread globally.
- The recent financial crisis emphasized how strong the links between different countries actually were.
- Recent financial crisis has also highlighted the importance of the financial market liquidity (i.e., Brunnermeier and Pedersen (2009)).
- However, we know little about how extreme returns are propagated across markets.
- To track shock propagation through financial system in the era of high-frequency trading we need intraday data.

Motivation (2)

- Previous work links coincidences of extreme returns to financial and macroeconomic variables.
- We offer a microstructure perspective on the propagation of financial shocks.
- We are the first to study intraday transmissions of shocks to liquidity and trading activity across markets, and to link these to transmissions of extreme returns.

Main contribution

- Shocks to price are the result of the information incorporation rather than low liquidity.
- Liquidity black holes are isolated events.
- Shocks to prices and trading activity are propagated across markets at the 5-minute frequency.

Dataset

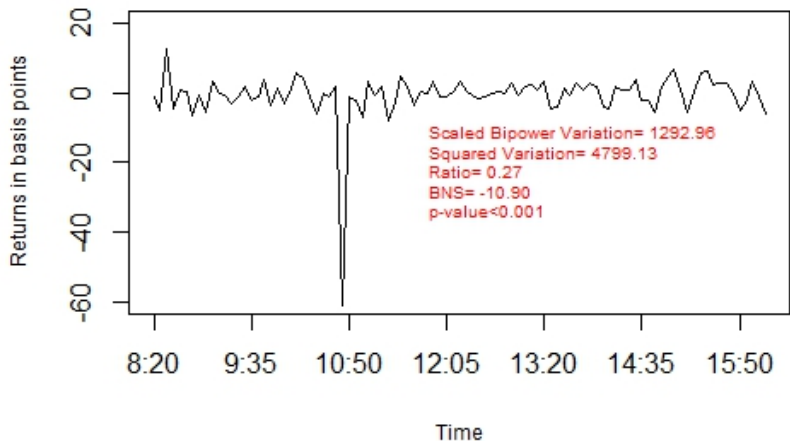
- Tick-by-tick data on trades and quotes provided by Thomson Reuters Tick History (TRTH).
- Total number of trades in the sample > 5 billion.
- Screens: standard filters are applied.
- Frequency: 5-minute.
- Period: from 1996 to 2011.
- Exchanges:
 - Asian region: Japan, Hong Kong, India, Malaysia
 - American region: Brazil, Canada, Mexico, US.
 - European/African region: France, Germany, South Africa, UK.

Variables

- Equally-weighted market-wide (on the basis of major index constituents).
- Variables:
 - return
 - liquidity
 - proportional quoted spread (PQSPR)
 - proportional effective spread (PESPR)
 - trading activity
 - turnover
 - order imbalance (OIB)

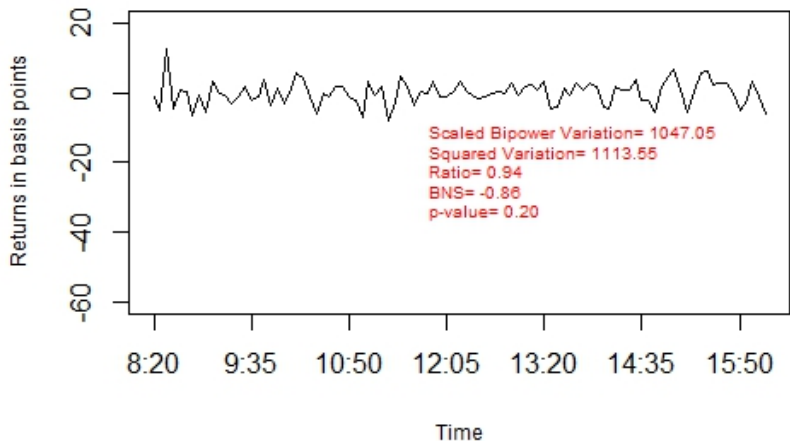
Jump measure: Barndorff-Nielsen and Shephard (2006)

(a) Returns on 09-02-2011 at London Stock Exchange
(with jump at 10:45)



Jump measure: Barndorff-Nielsen and Shephard (2006)

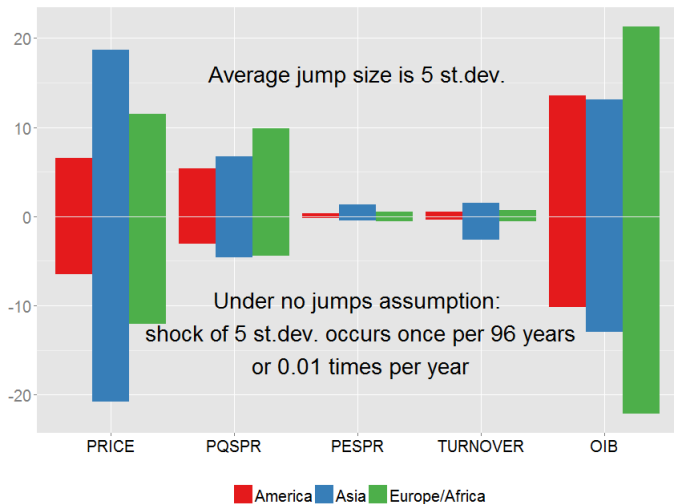
(b) Returns on 09-02-2011 at London Stock Exchange
(with jump at 10:45 substituted by 0)



Number of 5-minute intervals with jumps (1)



Number of 5-minute intervals with jumps (2)

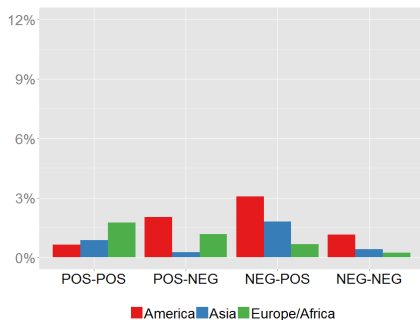


Price jumps: information v.s. liquidity

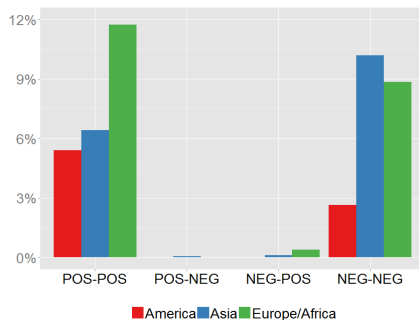
- Jumps in price can result from two sources:
 - lack of liquidity
 - information reasons.
- To distinguish between these two reasons we study:
 - simultaneous jumps in price, PQSPR, and OIB
 - return reversals around jumps in price
 - macroeconomic news announcements and jumps in price.

Simultaneous jumps (1)

PRICE and PQSPR

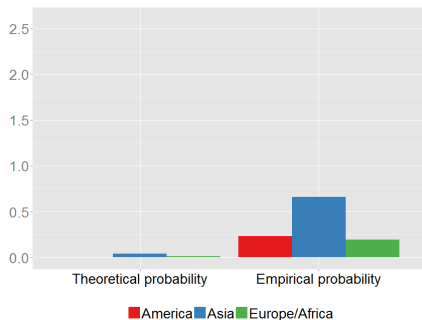


PRICE and OIB

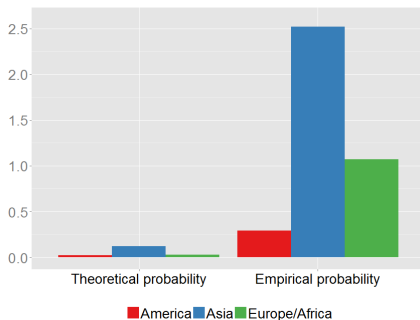


Simultaneous jumps (2)

PRICE and PQSPR



PRICE and OIB

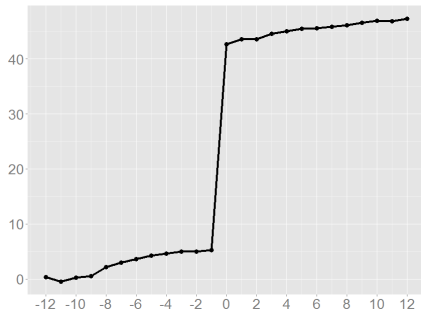


Simultaneous jumps (3)

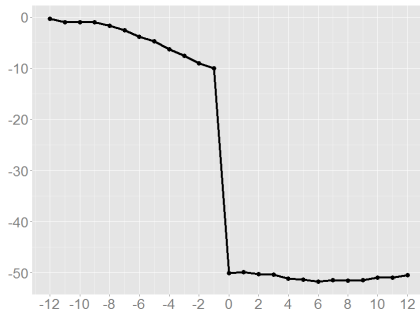
- No relation between jumps in price and PQSPR.
- Jumps in price are quite strongly associated with the jumps in OIB of the same sign.

Return reversals

Cumulative return around
positive jump in price



negative jump in price



Macroeconomic news

- Macroeconomic news¹
 - 2000-2011
 - U.S., Canada, EMU, Germany, France, U.K., Japan, and China
- Proportion of jumps that occur within one hour after a macroeconomic news announcement

	America	Asia	Europe/Africa
Jumps in PRICE	37.0%	14.6%	45.8%
Jumps in PRICE and OIB	39.8%	18.5%	59.5%

¹Data source: Econoday

Funding liquidity (1)

- Brunnermeier and Pedersen (2009): liquidity black holes start with a shock to funding liquidity which is propagated to market liquidity
 - jumps in market liquidity could have no relation to jumps in prices
 - jumps in market and funding liquidity could result in the price jump
- Funding liquidity proxies:
 - U.S. based
 - TED-spread
 - Default spread
 - LIBOR rates (USD, CAD, JPY, EUR, GBP)
 - Short-term interest rates
 - Bank index returns

Funding liquidity (2)

	Hong Kong	India	Japan	Malaysia
$PRICE < 0, TED > 0$	1	0	1	0
$PQSPR > 0, TED > 0$	0	0	0	2
$OIB < 0, TED > 0$	0	0	1	0

Funding liquidity (3)

- Jumps in funding liquidity are **NOT** related to
 - jumps in price
 - jumps in market liquidity
 - jumps in OIB

Spillover effects

- Spillover effect for jumps in price and OIB during the same 5-minute interval
- No spillover effects for PQSPR
- Spillover effects are stronger
 - within the region
 - for developed-developed country pairs
- Additional analysis: logit approach
 - Jumps in OIB in other countries matter for jumps in price

Conclusions

- Jumps in prices occur due to new information.
- Liquidity black holes are isolated events.
- Jumps in price and trading activity propagate between markets within the same 5-minutes.

Thank you!

Thank you for your attention!