Liquidity Dynamics around price jumps

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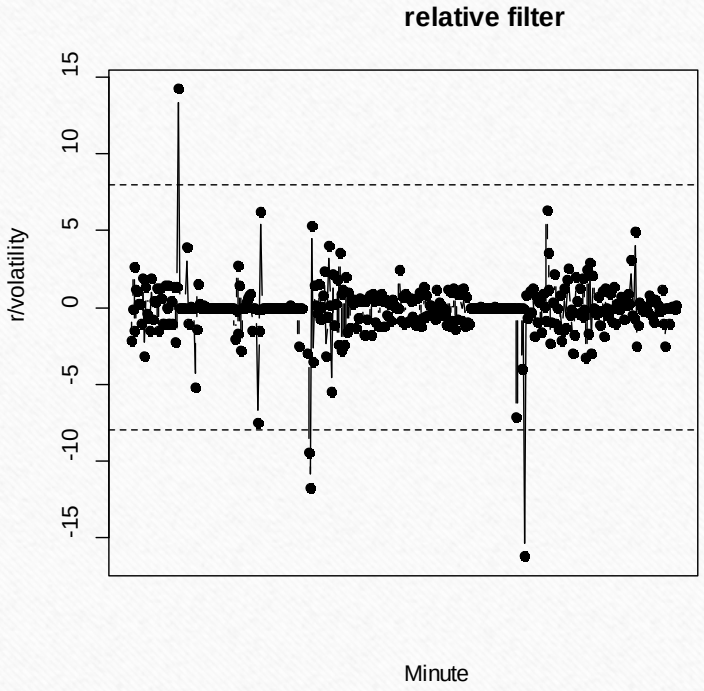
Research Question

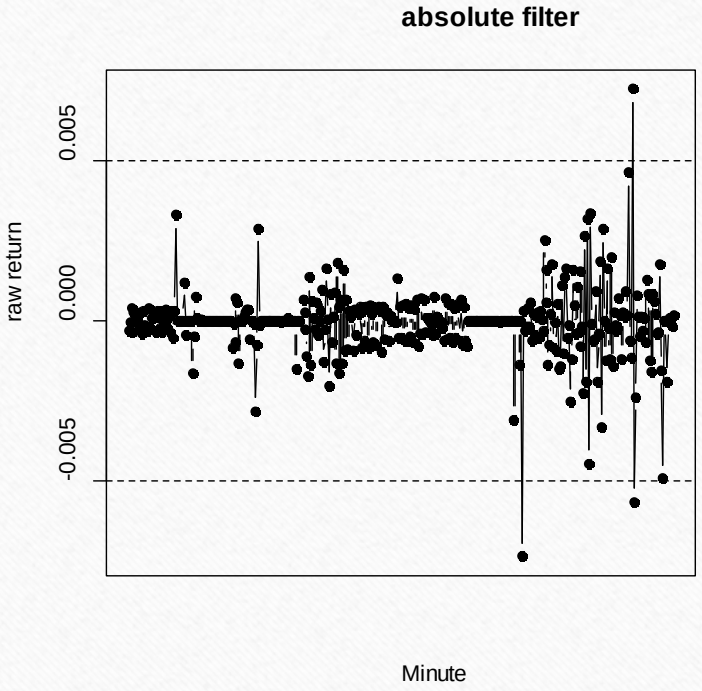
- 1.What happened to liquidity measures when price jumps?
- 2.Can price jumps be predicted by liquidity measures?

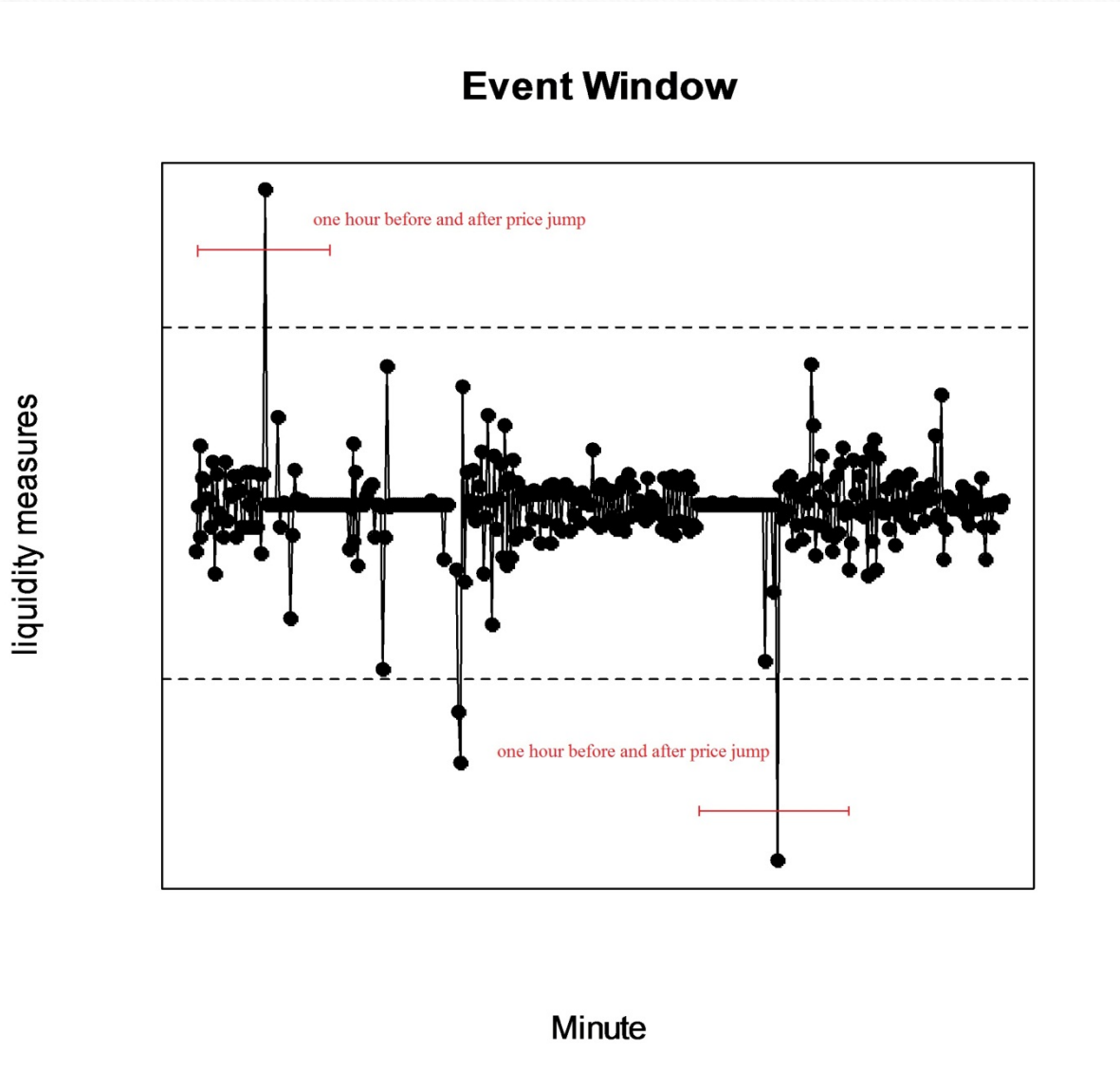
Content

1. Jump Detection
2. Dynamics Analysis
3. Conclusions

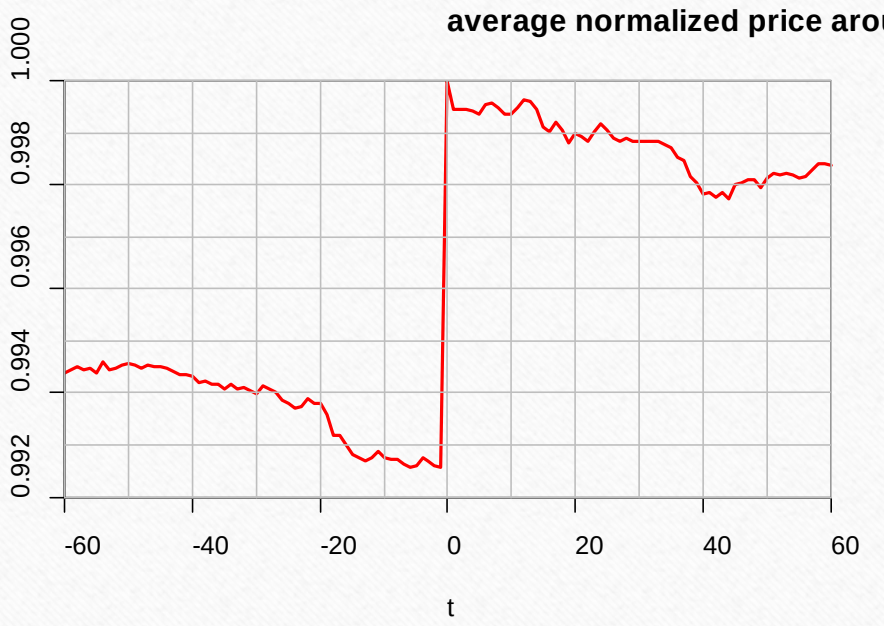
Jump Detection

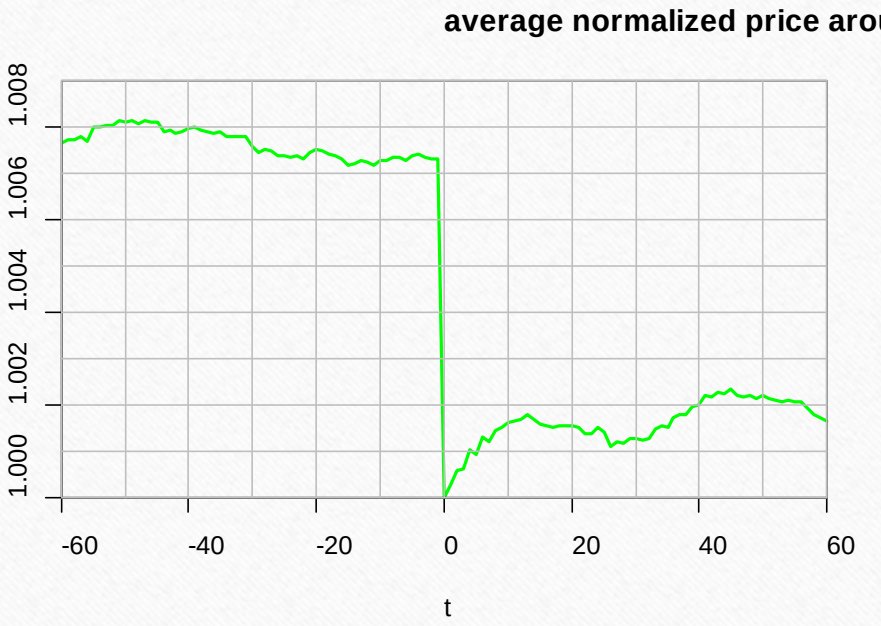




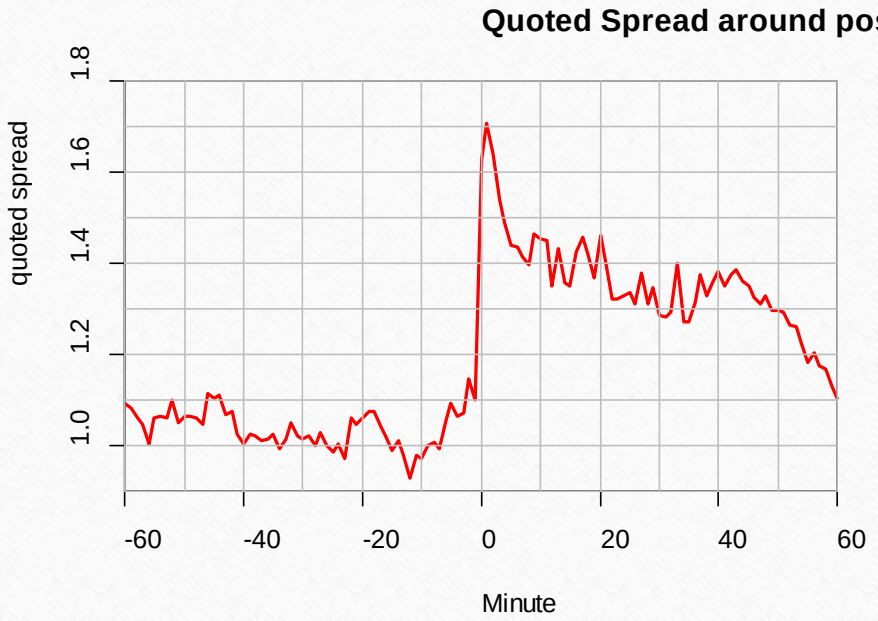

Event Window
one hour before and after price jump
one hour before and after price jump
liquidity measures
Minute

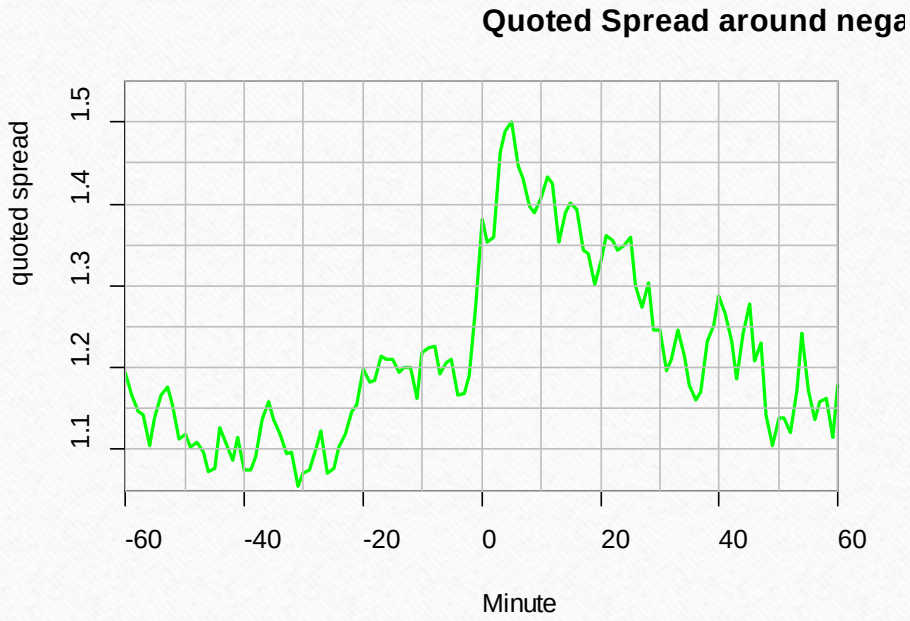
1 Normalized Price around Shocks



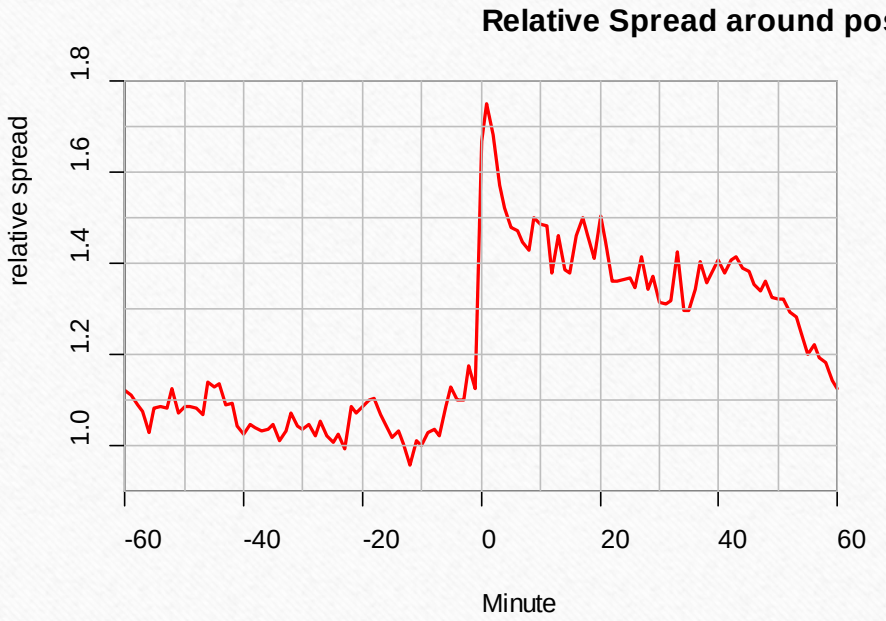


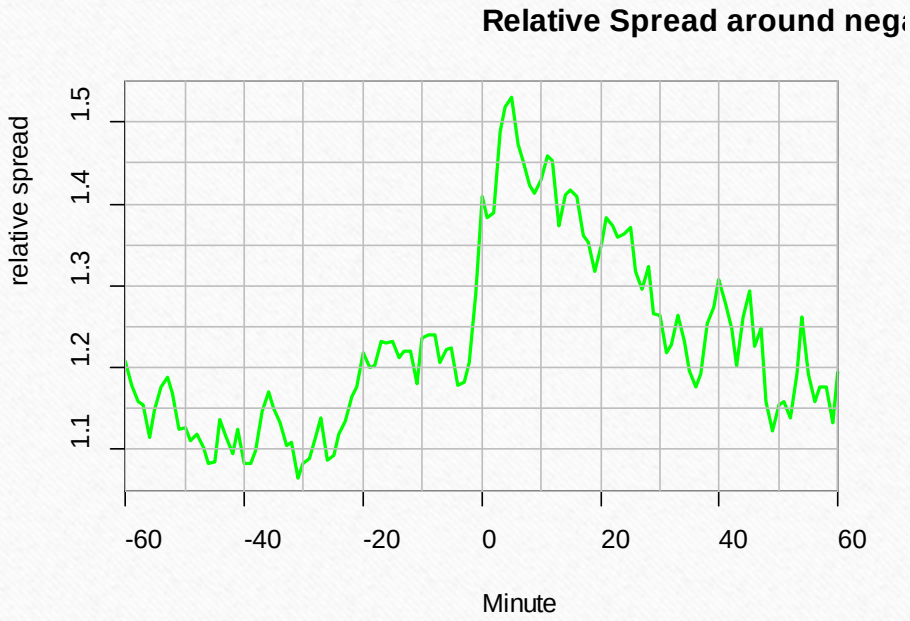
2 Quoted Spread



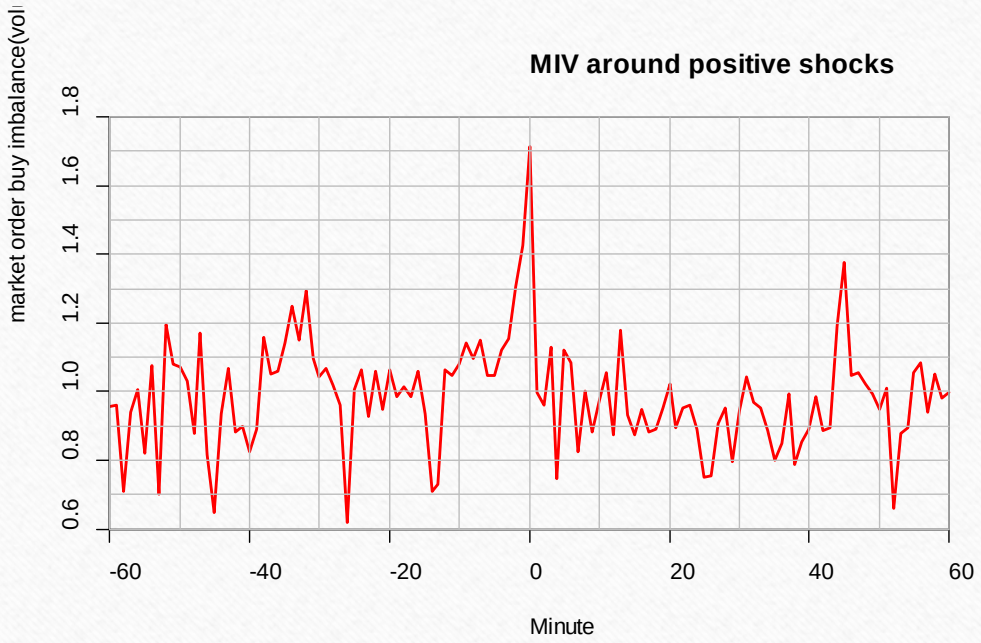


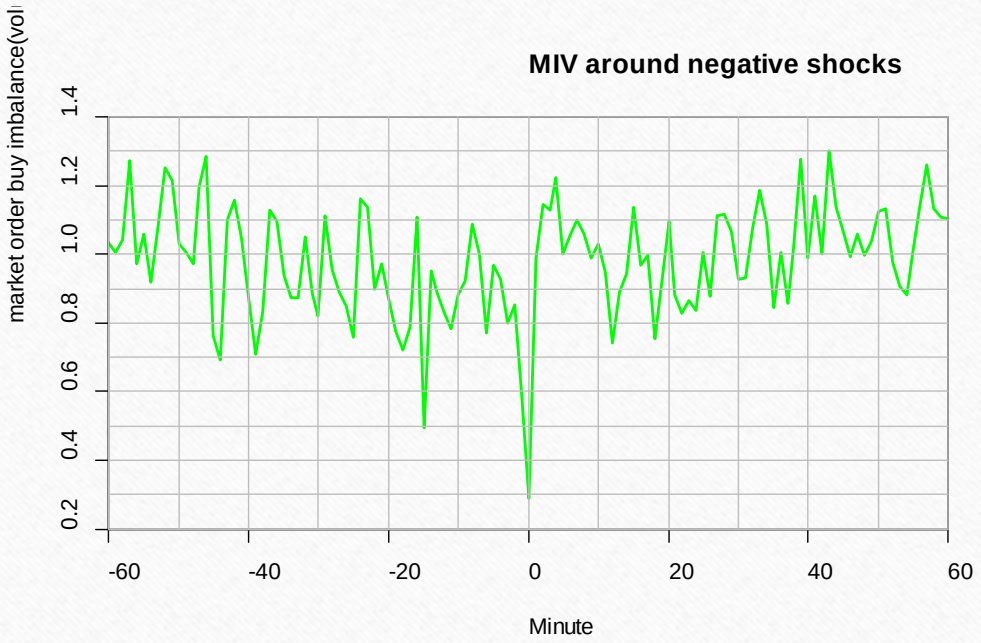
3 Relative Spread



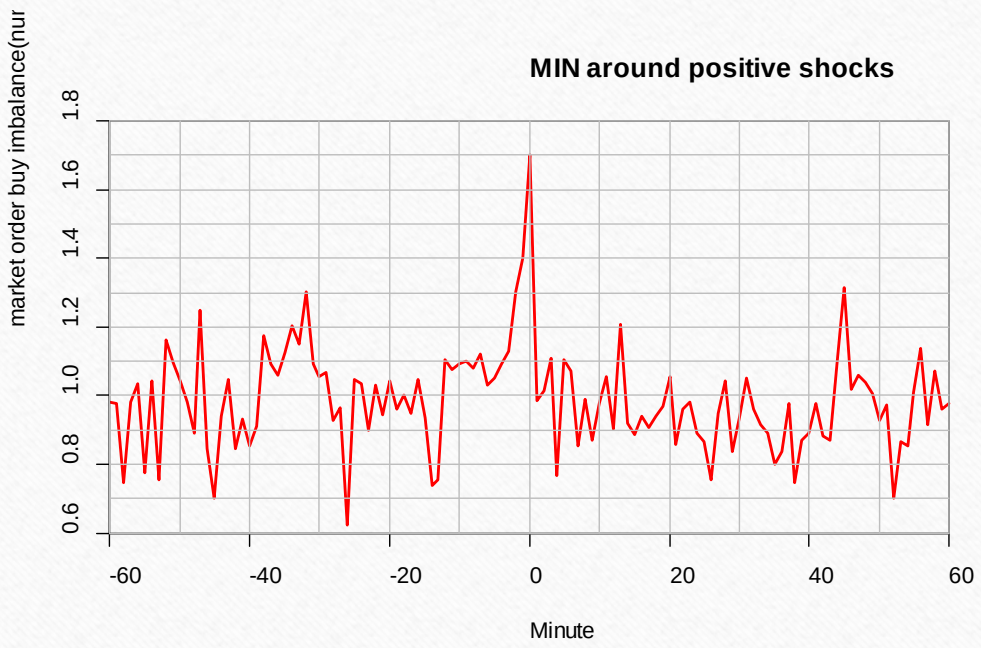


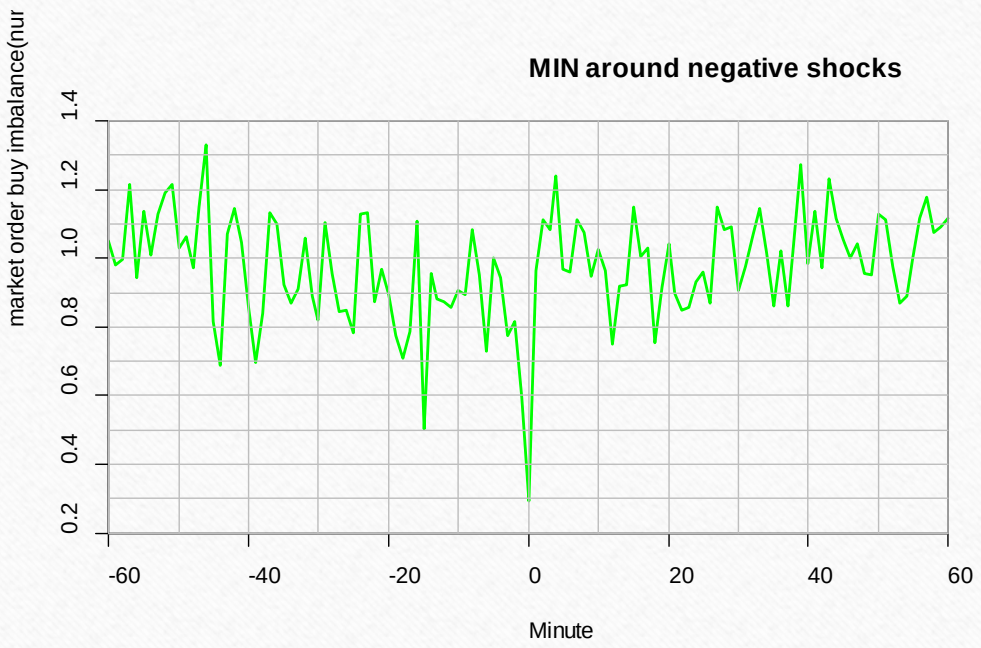
4 Market Order Buy Imbalance (volume)



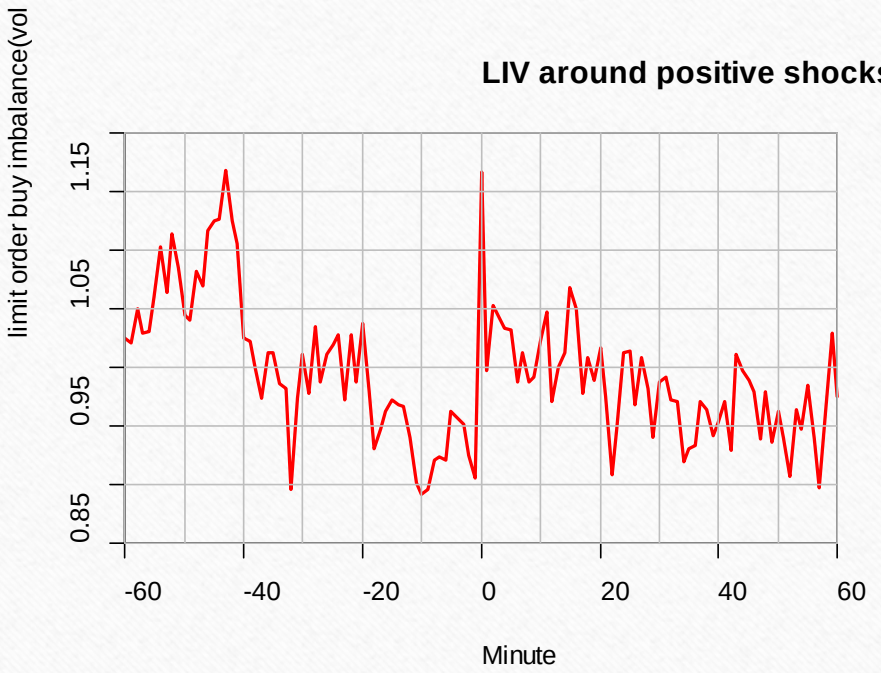


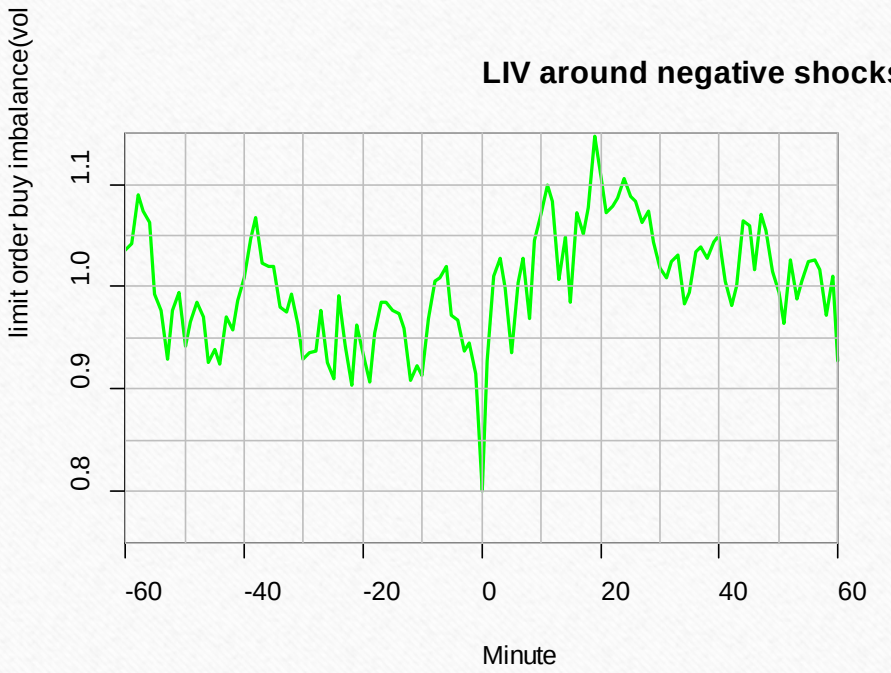
5 Market Order Buy Imbalance (order number)



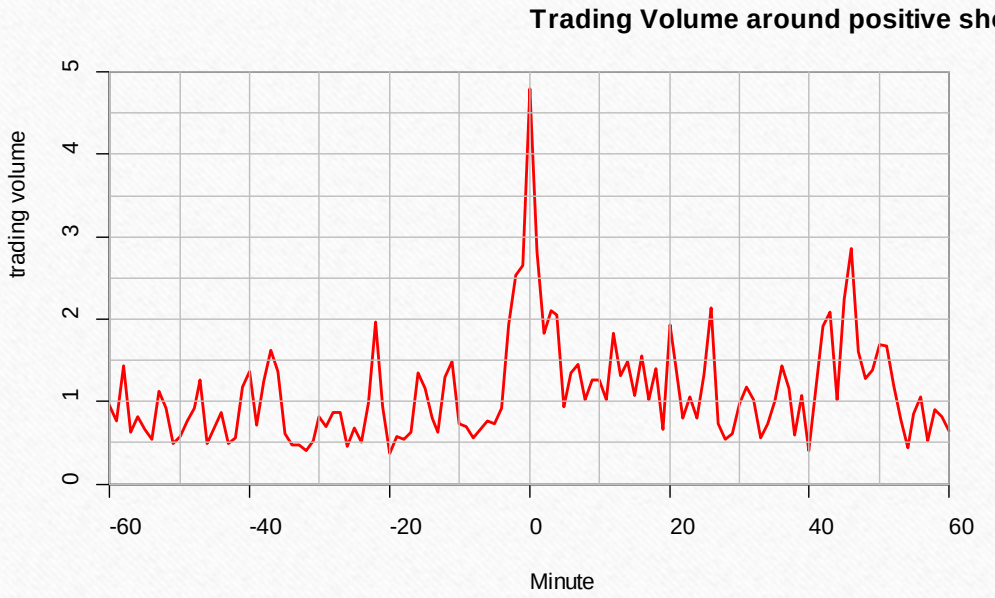


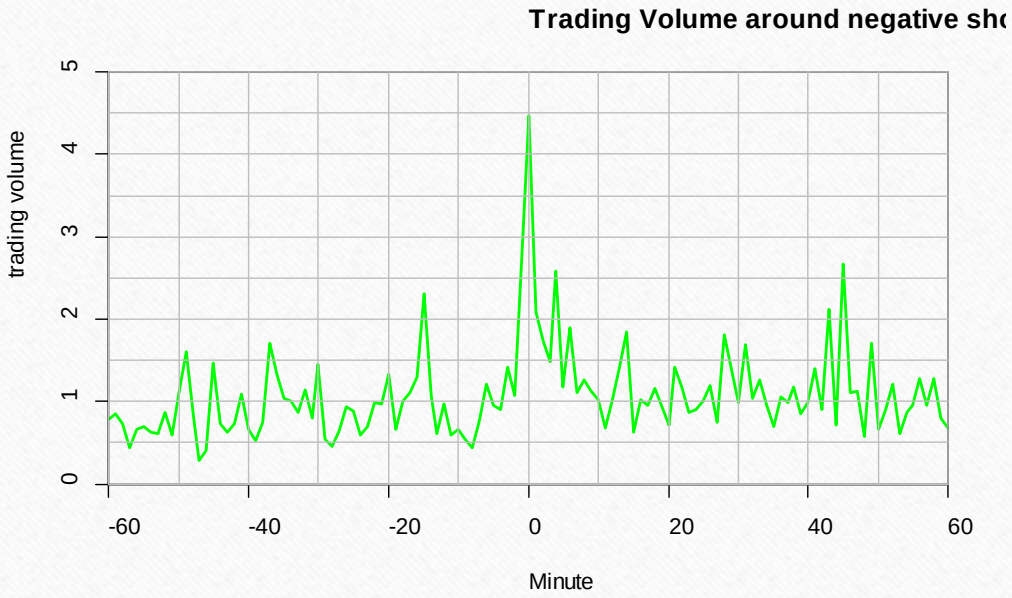
6 Limit Order Buy Imbalance (volume)



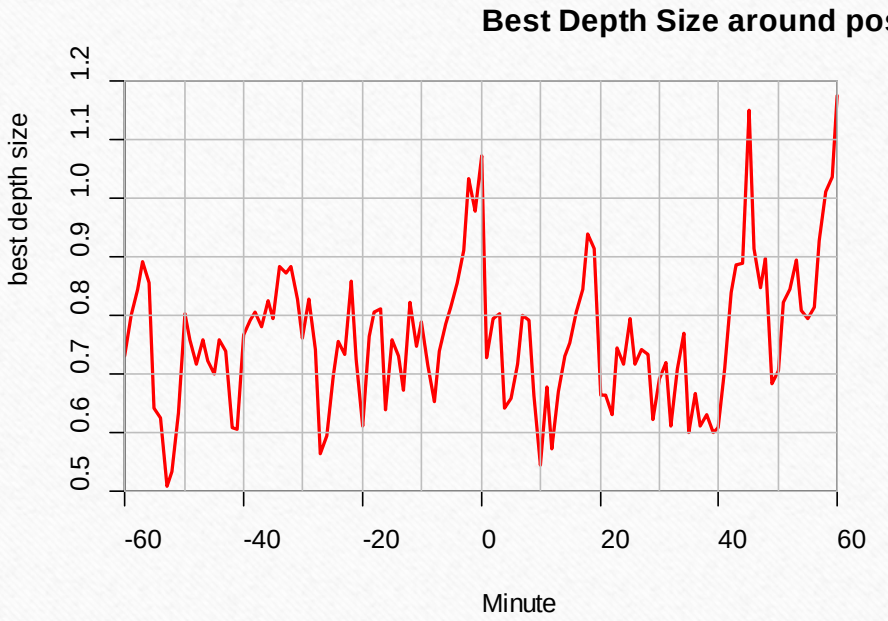


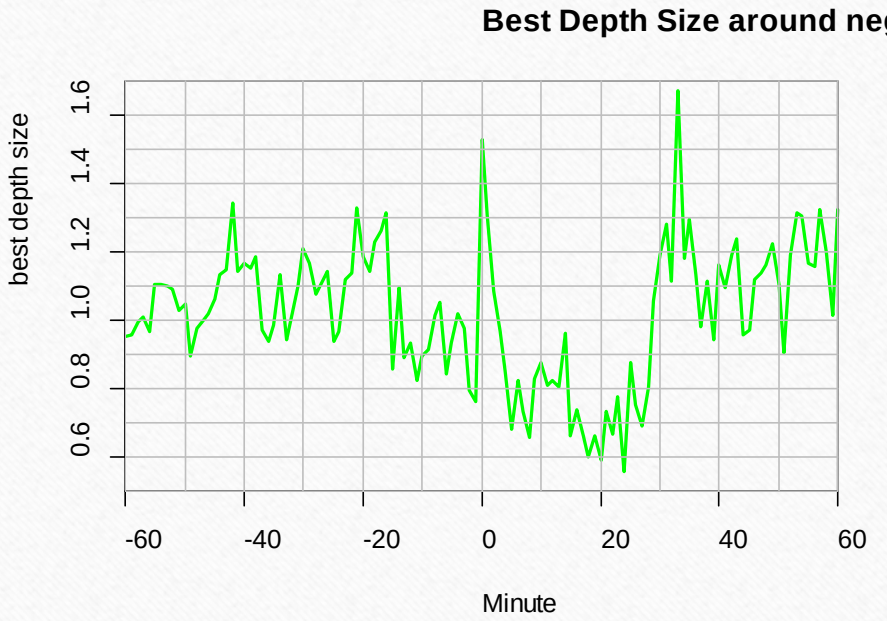
7 Trading volume





8 The best depth size





Two Sample t-test of trading volume at shock time and 3mins before shock time

	t=0 VS t=-1	t=0 VS t=-2	t=0 VS t=-3
statistic.t	2.6559	3.5292	4.344
parameter.df	403	386	389
p.value	0.008224	0.0004671	1.79E-05
Conf.int1	0.5106664	1.207356	1.736508
Conf.int2	3.4205378	4.244786	4.607962
estimate.mean of x	4.628957	4.628957	4.628957
estimate.mean of y	2.663354	1.902885	1.456722

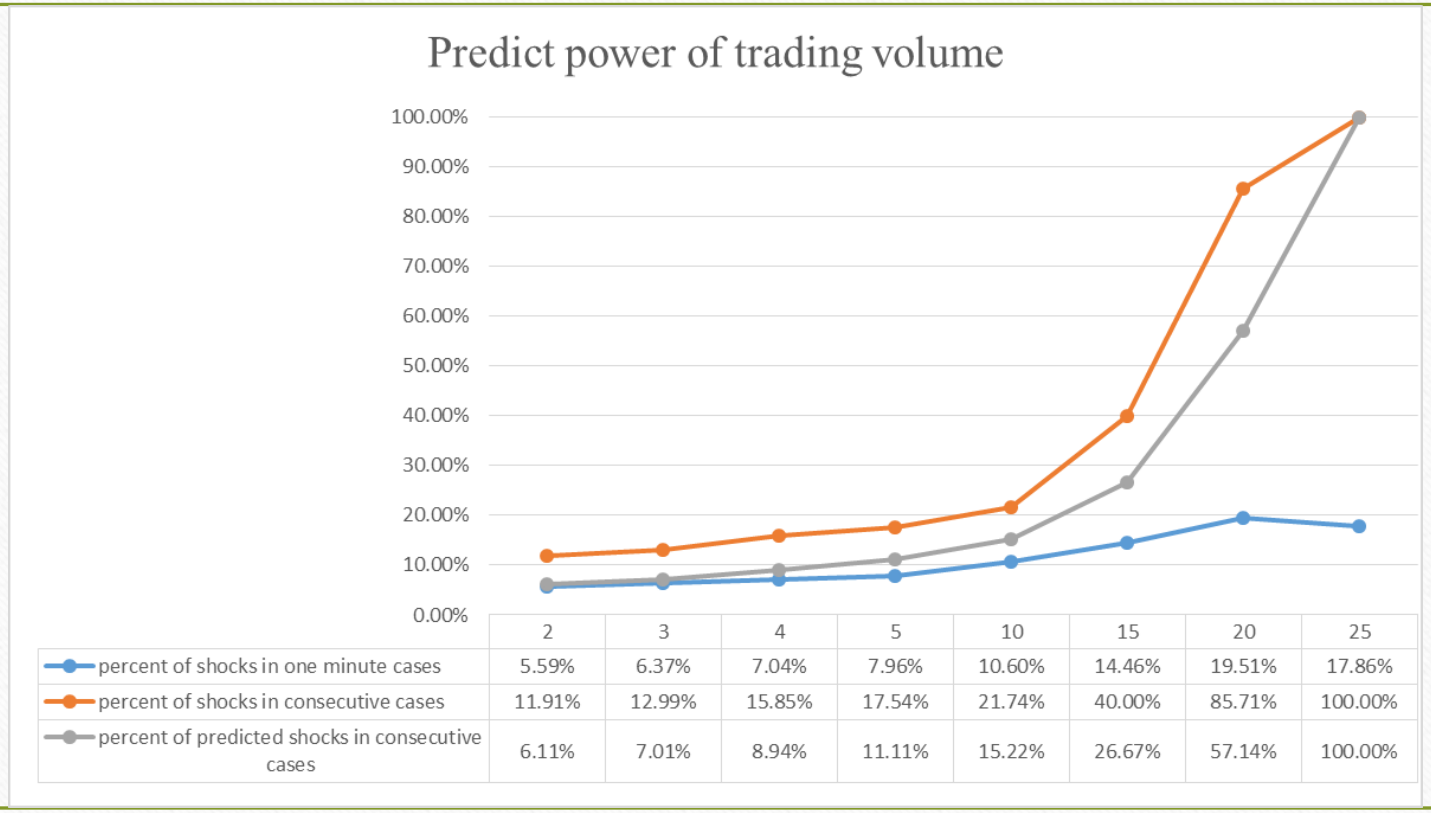
Two sample t-test 3mins before shock time and 60mins before shock time

	t=-3 VS t_rest	t=-2 VS t_rest	t=-1 VS t_rest
statistic.t	2.6885	4.5244	8.2711
parameter.df	4528	4525	4542
p.value	0.007205	6.21E-06	2.20E-16
Conf.int1	0.1589021	0.5853849	1.368368
Conf.int2	1.01478	1.4806245	2.21858
estimate.mean of x	1.4567215	1.9028852	2.6633544
estimate.mean of y	0.8698805	0.8698805	0.8698805

Two sample t-test of trading volume 3mins before shock time

	t=-1 VS t=-2	t=-1 VS t=-3	t=-2 VS t=-3
statistic.t	1.0482	1.9117	0.7591
parameter.df	217	220	203
p.value	0.2957	0.05722	4.49E-01
Conf.int1	-0.6694869	-0.03731627	-0.7126889
Conf.int2	2.1904254	2.45058205	1.6050162
estimate.mean of x	2.663354	2.663354	1.902885
estimate.mean of y	1.902885	1.456722	1.456722

Predict power of trading volume



	2	3	4	5	10	15	20	25
percent of shocks in one minute cases	5.59%	6.37%	7.04%	7.96%	10.60%	14.46%	19.51%	17.86%
percent of shocks in consecutive cases	11.91%	12.99%	15.85%	17.54%	21.74%	40.00%	85.71%	100.00%
percent of predicted shocks in consecutive cases	6.11%	7.01%	8.94%	11.11%	15.22%	26.67%	57.14%	100.00%

Future Research Focus

- 1.Causality relationship between liquidity measures and price shocks
- 2.The main driven factors of price shocks

Thank you!