

What causes intraday price jumps and co-jump in **Gold-** Market Psych, Macroeconomic News, or Illiquidity?

DR. NEHARIKA SOBTI GUPTA

ASSISTANT PROFESSOR (FINANCE)

INSTITUTE OF MANAGEMENT TECHNOLOGY (IMT), GHAZIABAD

PRESENTED AT

7TH IGPC-IIMA ANNUAL GOLD & GOLD MARKETS CONFERENCE 2024

INDIA GOLD POLICY CENTRE AT IIM AHMEDABAD

February 15, 2024

Venue: Bharat Mandapam, Pragati Maidan, New Delhi

Outline

Rationale & Motivation

Research Gaps from Literature

Research Questions & Objectives

Empirical Methods

Empirical Findings

Conclusion & Implications

Introduction

- Gold is a unique financial asset that is forward looking & reactionary
 - **Central Bank's Reserve Asset** - US – 78 %, **Strategic Financial Asset** (15% allocations)
 - Mainstream **international commodity, Store of Value** - Safe Haven, Hedge, Diversifier
- Gold market is remarkably efficient, making it hard to predict (Fama, 1970).
- Gold is most susceptible to the “madness of the crowds” and claim that more than any other asset, gold price change mainly because of investor perception than fundamentals (George Soros, Baur and Glover, 2015)
- Several instances of gold price spikes and crashes in intraday levels .

Why study price jumps in gold?

Gold prices jump to nearly 1-month high as Israel-Hamas war intensifies

Gold has benefited from a combination of geopolitical risk premium on fears of a

Gold, silver price jumps ahead of US Fed meeting minutes release. Should you buy in this rally?

Gold prices edge higher after Rs 2,500-crash in previous session; silver rates rally over Rs 1,300/kg

Analysts say latest headlines regarding COVID-19 vaccine is negative for gold but investors should wait for the dust to settle before making any changes in their gold investment

ETPrime

Gold Price Today: Gold jumps Rs 200/10 grams after a delayed start. Should you buy?

MACRO

High prices crash India gold demand 17% in Q1

Global factors, primarily US interest rate hikes, pushing up dollar prices, coupled with rupee depreciation, kept gold prices above ₹60,000/10g, nearly a 19% jump

Comex Gold Settles 1.25% Lower at \$1992.90

Gold prices fall on a firm dollar as spotlight moves to US CPI data

Gold retreats to over one-month low after data dims rate-cut hopes

Gold prices crash over Rs 1,000 as investors liquidate assets over coronavirus fears

Some surprising facts...

2013- \$1 trillion crash in gold

- Biggest single-day **percentage drop in prices of 4.1%** (\$63.50) on 12th April 2013
- Of which gold prices dropped **by \$25 within 2-minutes** due to massive selloff.

2020-21: COVID-19 induced gold crash

- Dramatic single-day fall on 7 August 2020 to \$1,863 from its record high of \$2075 due to intense sell-offs.
- 2021 - gold prices **dropped by 4% in a single day due to a rise in US yields**

2021- US Non Farm payroll surprise & liquidity shock

- Sudden drop by \$100 on 7 August 2021 from \$1,764 to \$1,677, of **which 90% of the price fell in just 15 minutes**

Gold 20 years USD

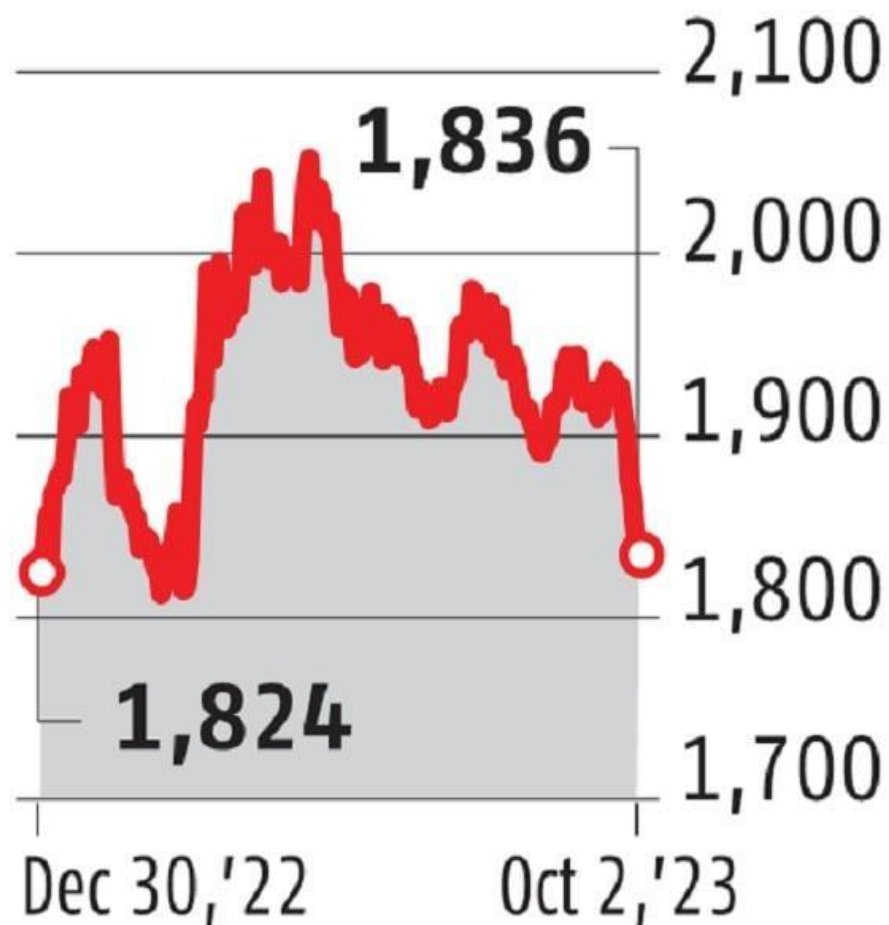
USD/kg [Set price alert](#)



Embed

BullionVault

GOLD PRICE (in \$/Oz)





Gold Feb 24 (GC=F) ☆

COMEX - COMEX Delayed Price. Currency in USD

2,024.70 -4.60 (-0.23%)

As of 02:43AM EST. Market open.

Indicators Comparison | Date Range 1D 5D 1M 3M 6M YTD 1Y 2Y **5Y** Max | Interval 1W v Candle v Draw Settings





90
70
50
30
10
52
51
50
49
48
47
46
45
44
43
42
41
40
39
38
37
36
35
34
33
32
31
30
29
28
27
26



Price Jumps & Co-Jumps

- Price Jump are **high-impact events indicating tail risk manifested as discontinuities in prices**, which are due to sudden, rare, and substantially large upward or downward movements in prices **for a short interval of time** (Nguyen et al.,2020).
- Jumps are conduits that reflect an **immediate market reaction to information shocks** (Frömmel, Han, Gysegem, 2015).
- Co-jumps are the **simultaneous occurrence of price jumps contemporaneously in two or more markets.**
- Co-jumps represent non-diversifiable risk (Bollerslev et al., 2008) and are important for asset allocation and contagion (Caporin et al.,2017; Barunik and Vacha,2018).

Motivation & Need for study

Multiple instances intraday gold price crash and jumps- **under-researched topic**

No systematic examination of gold price jumps characteristics, dynamics, drivers, and impact on market quality in past literature

Unanticipated nature of price jumps – **information driven vs. liquidity driven** (Dumitru and Urga, 2012, 2016; Frömmel et al., 2015)

No consensus in past literature as to what causes price jumps **in gold** (Nguyen et al., 2020; Scaillet et al., 2018; Boudt and Petitjean, 2013)

Motivation & Need for study

Some argue it's **macroeconomic news** (Andersen et al.,2007a; Lahaye et al.,2011; Lee,2012; Caporin and Poli, 2018; Baker, Bloom, et al.,2021;),

Others find **shocks to liquidity** (Nguyen et al.,2020; Scaillet et al.,2018; Christensen, Oomen, and Podolskij,2014; Boudt and Petitjean, 2013)

While other argues its **investor overreaction and emotions** (Tetlock, 2007; Li et al., 2021)

CENTRAL RESEARCH QUESTION?

What causes intraday price jumps and co-jumps in gold markets- market psych, macroeconomic news announcements and surprises, or illiquidity or trading activity?

Channel Mechanism

1. Market Psych

1.1. Attention

Cause of overreaction and underreaction to news (Hirshleifer and Teoh, 2005; Li et al. (2021), which results in price jumps and crashes

1.2. Sentiments

Real-time irrationality of noise traders is best reflected in media-based sentiment (Barnuik & Vosvrda, 2009; Siegel, 1992; Wolff, 2013; Zhu et al., 2017) find that investor sentiment pervasive in predicting stock market crash and collapse

1.3. Emotions

Emotional reaction of investors to news or new information, which causes prices to change (Mayew and Venkatachalam, 2012; Price et al., 2016; Shen et al., 2017; Ge et al., 2020)

Channel Mechanism

2. Shocks to Liquidity

2.1. Trading Activity

Trading volume,
number of trades
(Giot et al.,2010;
Picotti (2017; Boudt
and Petitjean, 2014).
Sun and Gao (2019)

2.2. Trading Cost

Positive relation if
information driven
(Collin-Dufresne and
Fos (2016b
Negative if
uninformed trading
shocks to uninformed
volumes or trading

2.3. Price Impact

Order imbalance
Evans and Lyons
(2002), Brandt and
Kavajecz
(2004) Scaillet et
al.(2020), and Wu,
Liu et al.(2020)

2.4. Illiquidity

Jiang & Yao (2013)
and Lee(2012));
Mancini et al.
(2013)).
Brunnermeier and
Pedersen

MAIN RESEARCH QUESTIONS

- (1) Does news or social media-based investor attention to gold improve the predictability of intraday price jumps and co-jumps in gold? Is there an attention asymmetry for positive and negative jumps?
- (2) Does positive (negative) market sentiment for gold increase the predictability of positive (negative) price jumps?
- (3) Do emotions triumph over facts in the predictability of intraday price jumps and co-jumps in gold?
- (4) Which scheduled macroeconomic news surprises can predict intraday price jumps and co-jump in gold markets?
- (5) Does shrinkage in liquidity cause price jumps and co-jumps in gold?

Research Objectives

1) To detect high-frequency price jumps in gold markets

2) To detect high-frequency co-jumps in gold markets

3) To examine high-frequency predictors of gold price jumps

4) To examine high-frequency predictor of co-jumps in gold markets

Contribution

First-time evidence of high-frequency jump dynamics in gold markets by identifying intraday price jumps and co-jumps in two major gold trading instruments—COMEX gold futures and SPDR Gold ETF.

Draw a comparative analysis of characteristics and sources of intraday price jumps and co-jumps between the two largest yet different gold markets.

Deploy a combination of intraday jump detection techniques, namely—Andersen et al.(2007) and Bollerslev et al.(2013),

Using high-frequency data sampled at 5 minutes for a relatively long sample period covering eight years from 1st January 2010 to 31st March 2018.

Contribution

Identifying high-frequency determinants of price jumps and co-jumps separately for all, positive, and negative price jumps and co-jumps

Both news and social media-based indicators on intraday gold price jumps and co-jumps by using a proprietary high-frequency dataset, Thomson Reuters Market

Exhaustive coverage of 29 US scheduled macroeconomic news surprises.

Comprehensive intraday event study analysis using a constant mean return model for short intervals for all classes of predictor variables, separately for positive and negative price jumps

Empirical Method :Intraday Jumps

Andersen et al.(2007)

- Intraday jumps are the large returns compared to a local estimate of volatility.
- Procedure to identify intraday price jumps at time t is to simply
- Scale the magnitude of the return of the midquote (r_t) observed at time t by the lagged jump robust local estimate of volatility $\sigma_{t-1}(r)$.
- If this ratio exceeds the critical value, we reject the null hypothesis that r_t is a normal return.
- $\kappa_S(\Delta) = r_{t+s.\Delta,\Delta} \cdot 1 \left(|r_{t+s.\Delta,\Delta}| > \Phi_{1-\frac{\beta}{2}} \cdot \sqrt{\Delta \cdot BV_{t+1}(\Delta)} \right), \quad s = 1, 2, \dots, 1/\Delta$
- where, $\Phi_{1-\frac{\beta}{2}}$ is the corresponding critical value from the standard normal distribution, $1(x)$ is an indicator function when x is true and 0, otherwise.
- $BV_{t+1}(\Delta) = \mu_1^{-2} \sum_{j=2}^{1/\Delta} |r_{t+j.\Delta,\Delta}| |r_{t+(j-1).\Delta,\Delta}| \rightarrow \int_t^{t+1} \sigma^2(s) ds \quad ; \text{ where } \mu_1 = \sqrt{2/\pi}$

Empirical Method: Co-Jumps

Co-exceedance rule (Gilder 2018) to detect intraday co-jumps between two gold markets: COMEX gold ETF and SPDR gold ETF.

The intuition behind the co-jump detection rule is that a co-jump ($Co - Jump_{i,t}$) is identified when j assets exhibit intraday price jump $Jump_{i,t,j}$ at the i -th high-frequency return on t -th trading,

$$Co - Jump_{i,t} = Jump_{i,t}^{COMEXFUTURES} \cap Jump_{i,t}^{ETFSPDR}$$

Empirical Method: Event Study Methodology

- Define the event – Occurrence of intraday positive or negative price jump
- Event Window : $t - 60 \text{ min}$ to $t + 60 \text{ mins}$
- Estimation window : -120 mins to -60 mins
- Constant mean return model : Abnormal Values $-Ax_{i,t+j\Delta} = x_{i,t+j\Delta} - E_{T,j}[x_{i,j}]$
- *Standardising the abnormal values*
- Aggregated across all years in the sample
- Mann-Whitney test : *Ho - Jumps have no impact on predictor variables*

Empirical Findings : Price Jumps

COMEX gold future experiences a greater number of intraday jumps (1101) than SPDR Gold ETF (1045) from 2010-2018.

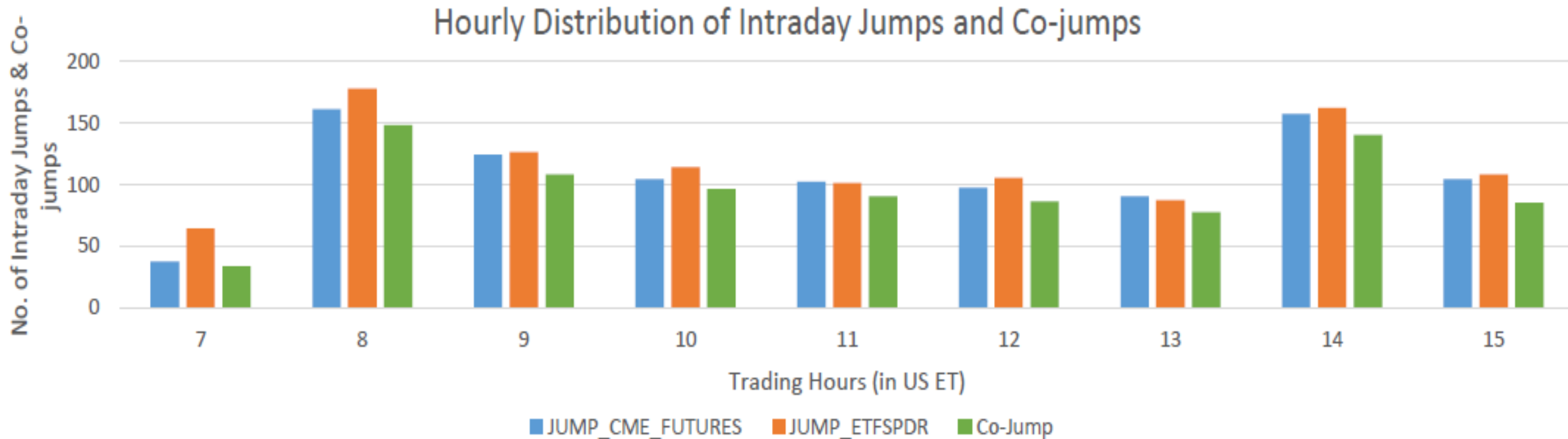
Gold market crashes are more prominent than price increases

US scheduled macroeconomic news is the most dominant predictor of intraday price jumps and co-jumps

Trading activity, trading cost, and volatility are at elevated levels 10-15 minutes before both positive and negative jumps.

Buy-side order flow rises during positive price jumps, and sell-side order flow rises during negative price jumps.

Empirical Findings : Price Jumps

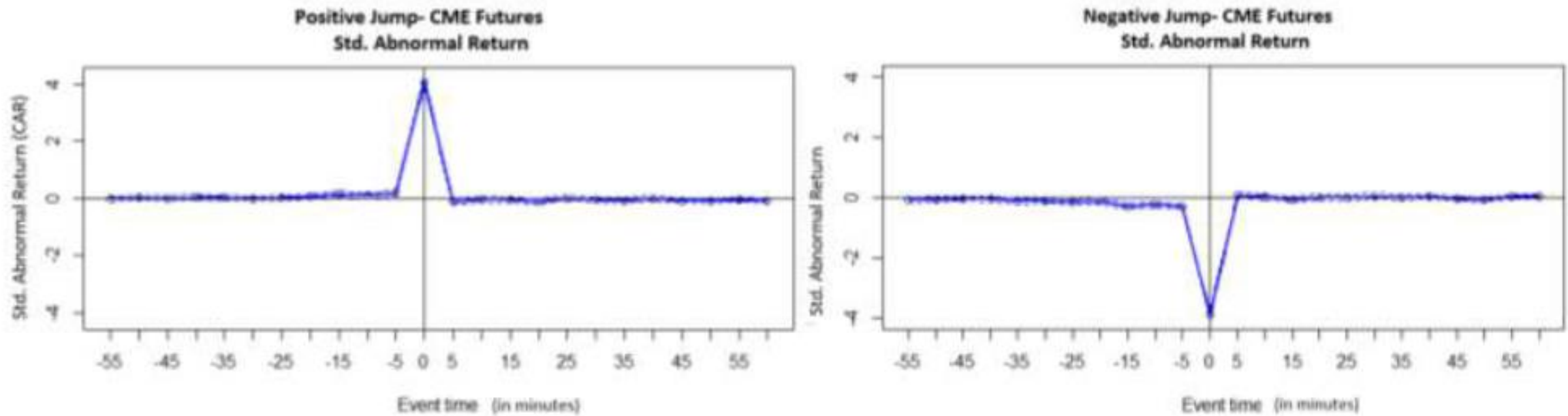


Empirical Findings : Price Jumps

| | CME Futures | | | ETF SPDR | | |
|---------------------------------------|-------------|---------------|---------------|-----------|---------------|---------------|
| Summary Statistics for Intraday Jumps | ALL JUMPS | POSITIVE JUMP | NEGATIVE JUMP | ALL JUMPS | POSITIVE JUMP | NEGATIVE JUMP |
| No. of Intraday Jump | 1101 | 539 | 562 | 1045 | 520 | 525 |
| P(Intraday Jump) (%) | 53.3 | 26.1 | 27.2 | 50.4 | 25.1 | 25.3 |
| Median Jump Size(%) | -0.060 | 0.276 | -0.264 | -0.086 | 0.292 | -0.278 |
| Max Jump Size (%) | 1.593 | 1.593 | -0.039 | 1.590 | 1.590 | -0.082 |
| All US News Announcements Obs. | 2222 | 2222 | 2222 | 2225 | 2225 | 2225 |
| P(Intraday Jump US News Day) (%) | 13.80% | 7.14% | 6.67% | 14.98% | 7.86% | 7.12% |

Empirical Findings : COMEX Intraday Event Study

Fig 2(a) Cumulative Abnormal Return (CAR) around Positive Jump and Negative Jump

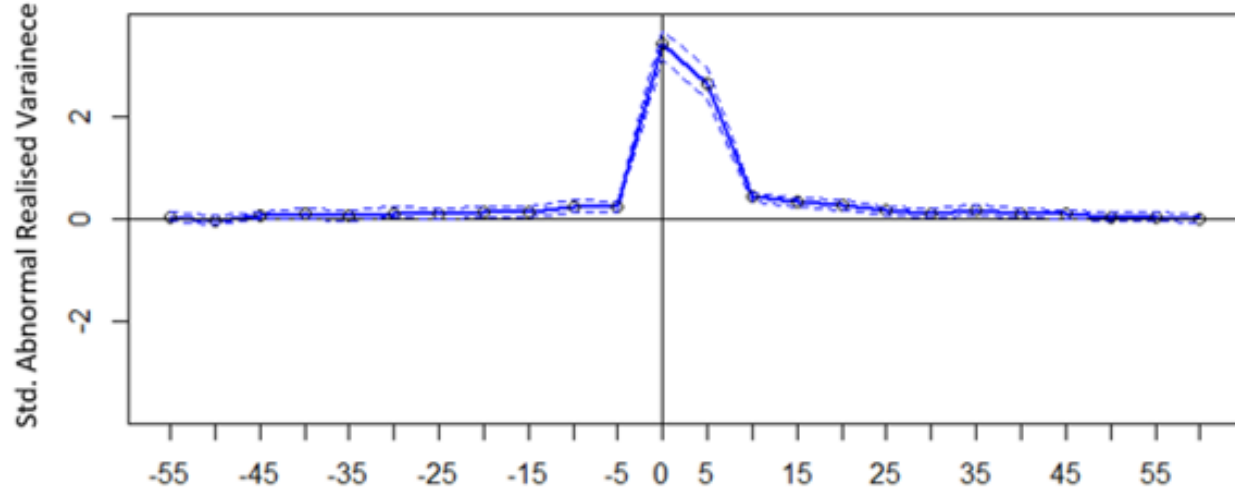


Empirical Findings :

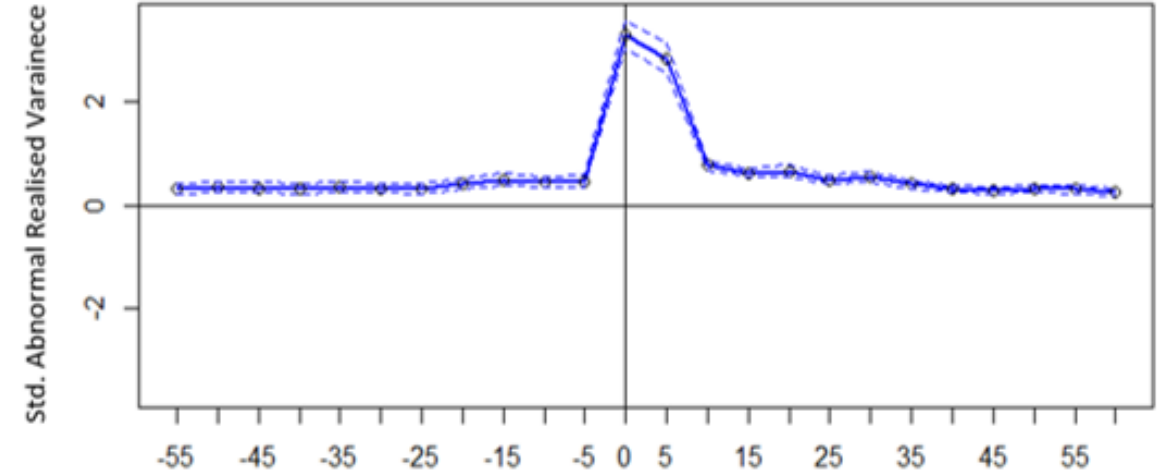


INDIA
GOLD POLICY
CENTRE

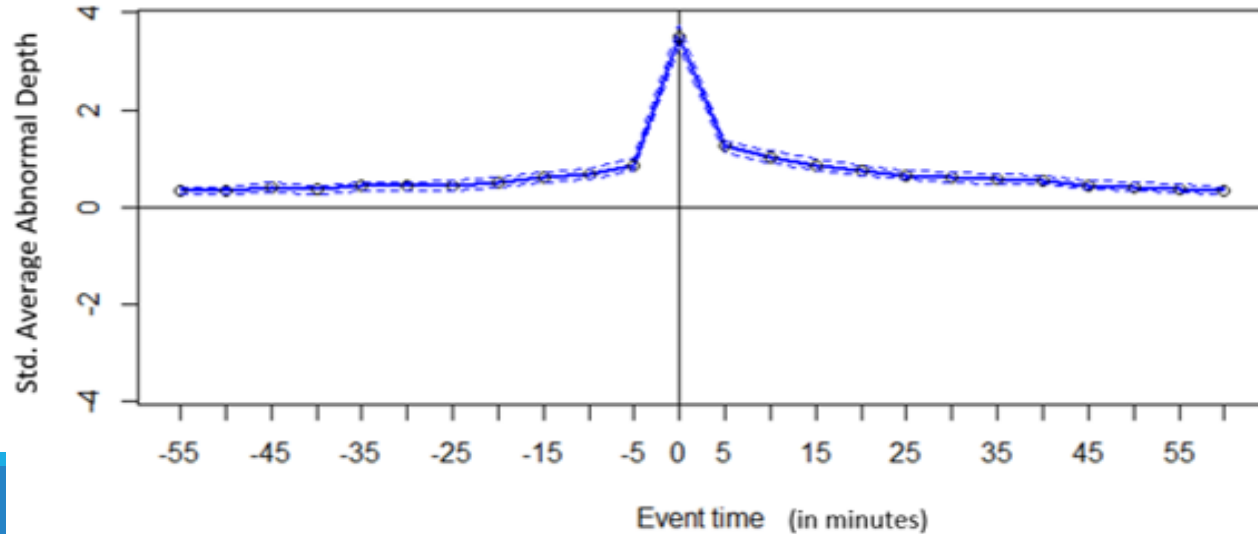
**Positive Jump- CME Futures
Realised Variance (RV)**



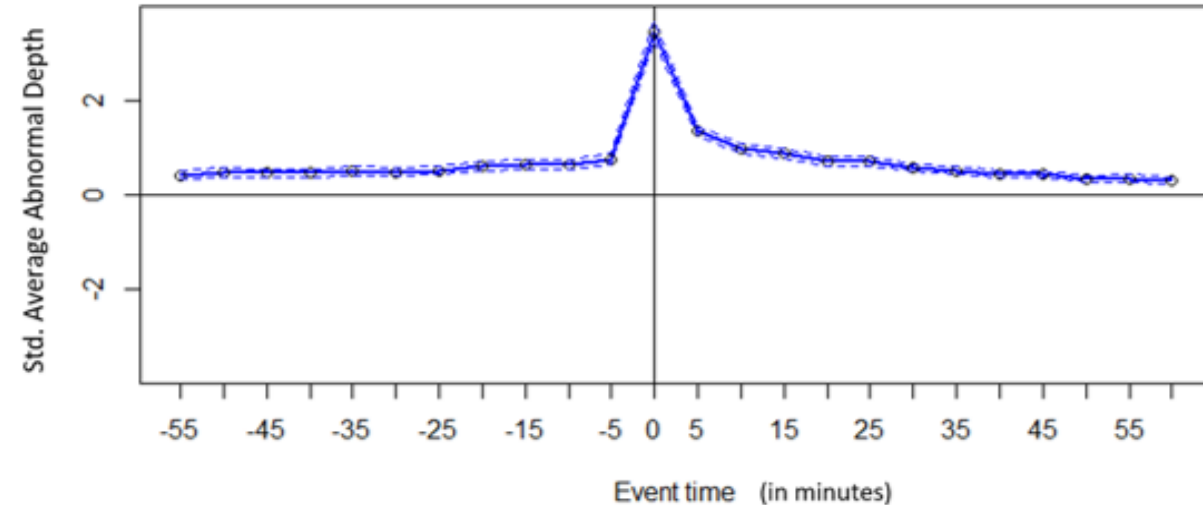
**Negative Jump- CME Futures
Realised Variance (RV)**



**Positive Jump- CME Futures
Average Abnormal Depth**



**Negative Jump- CME Futures
Average Abnormal Depth**



Empirical Findings :

Fig 3(d) Number of Trades around Positive Jump and Negative Jump

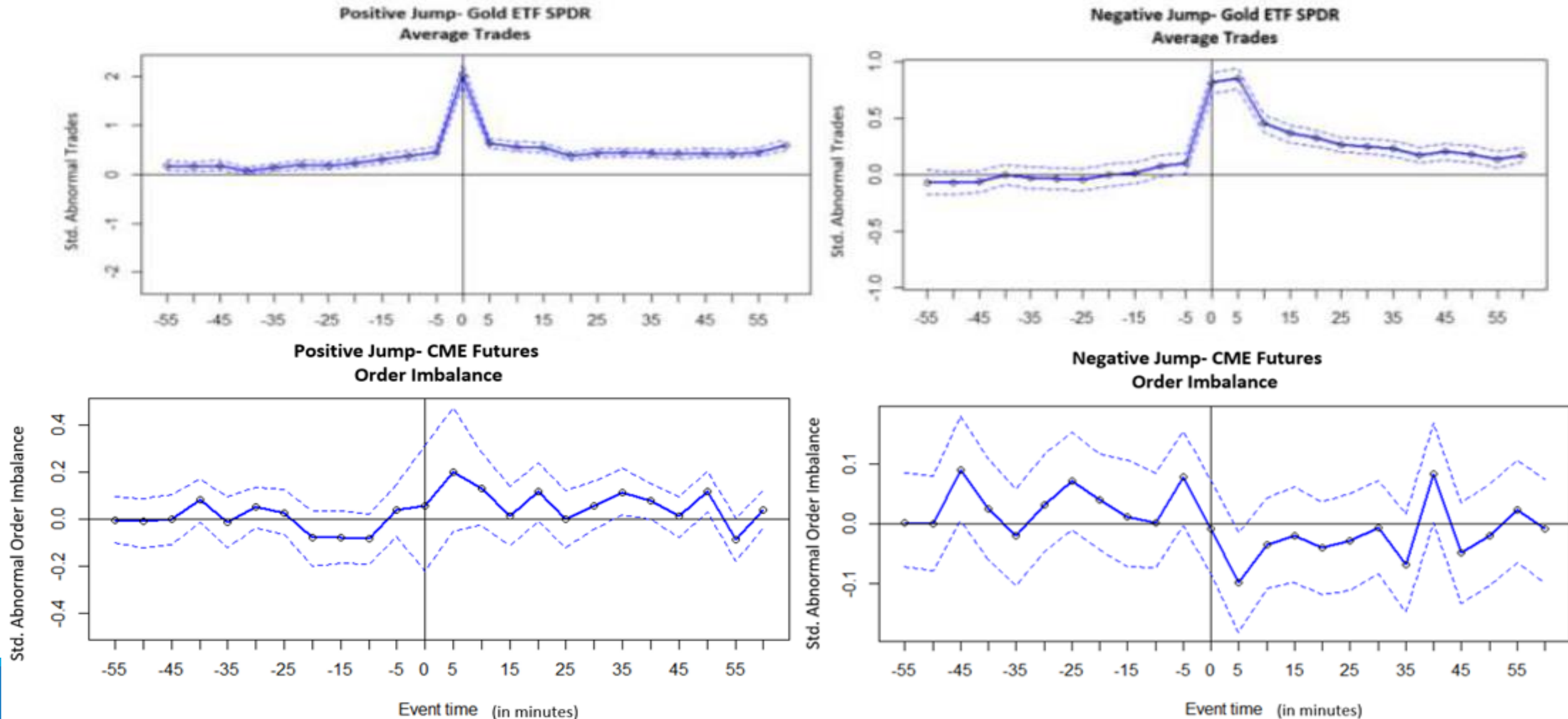


Fig 2(f). Proportional Effective Spread around Positive Jump and Negative Jump

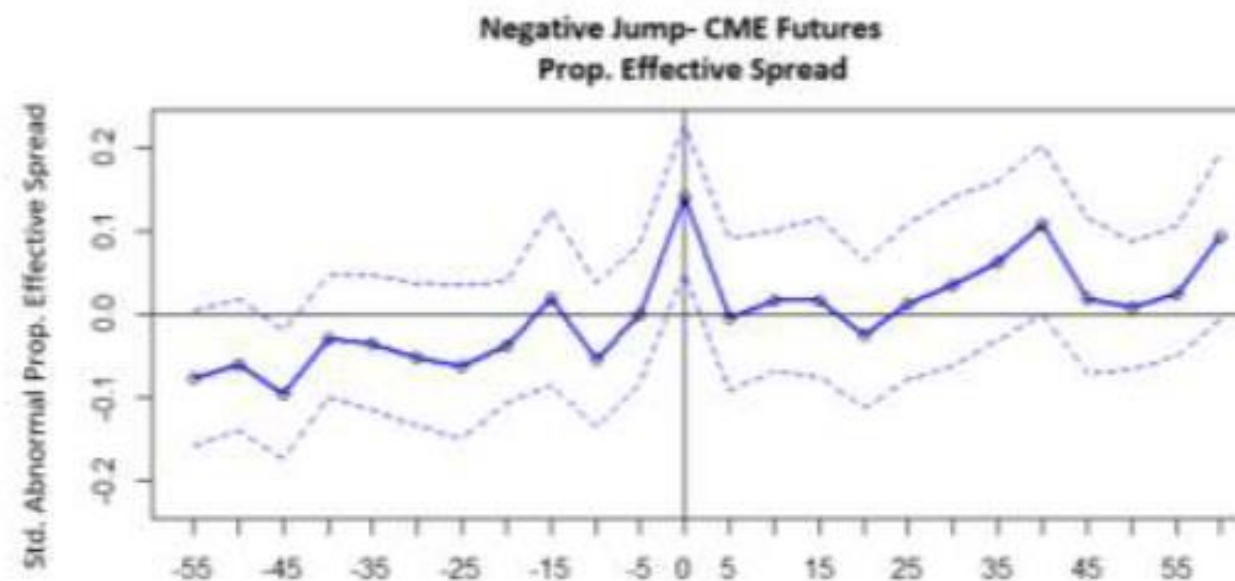
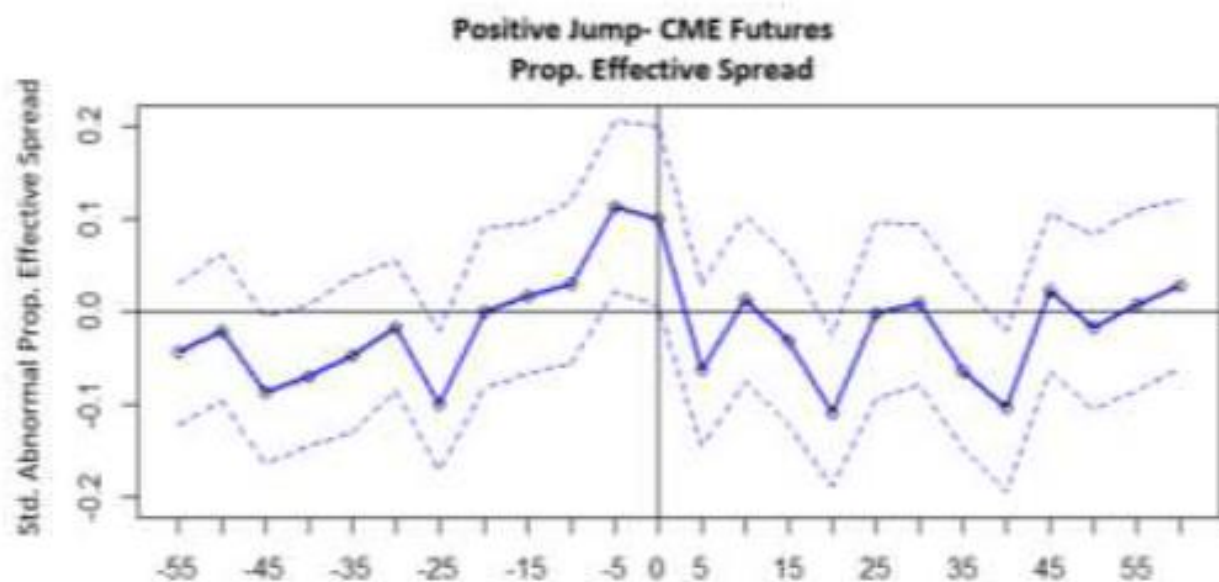
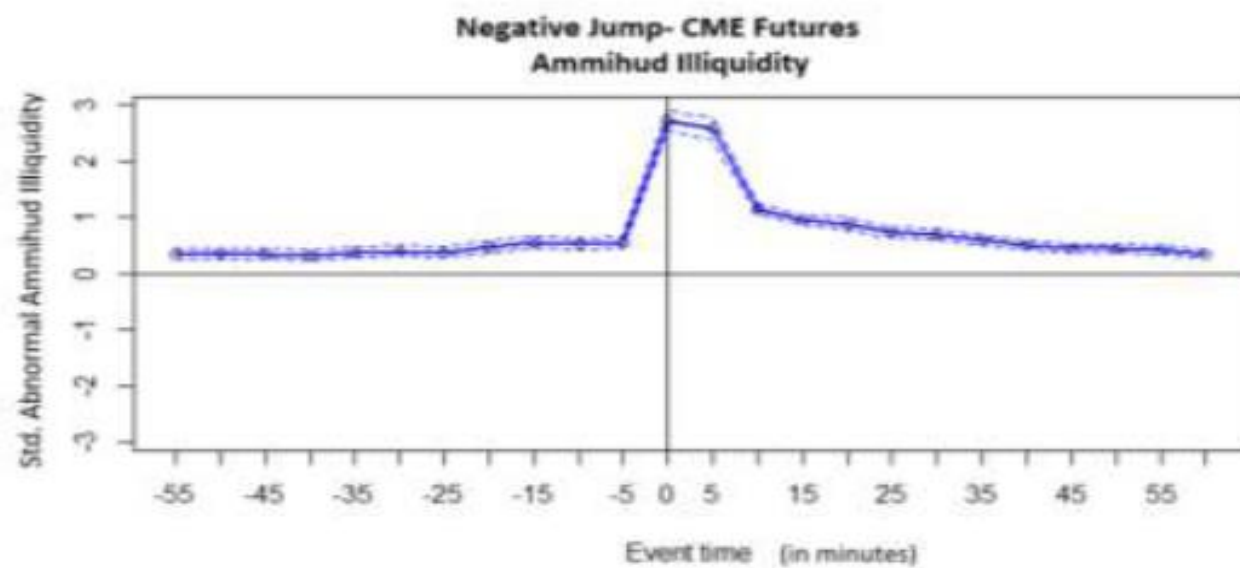
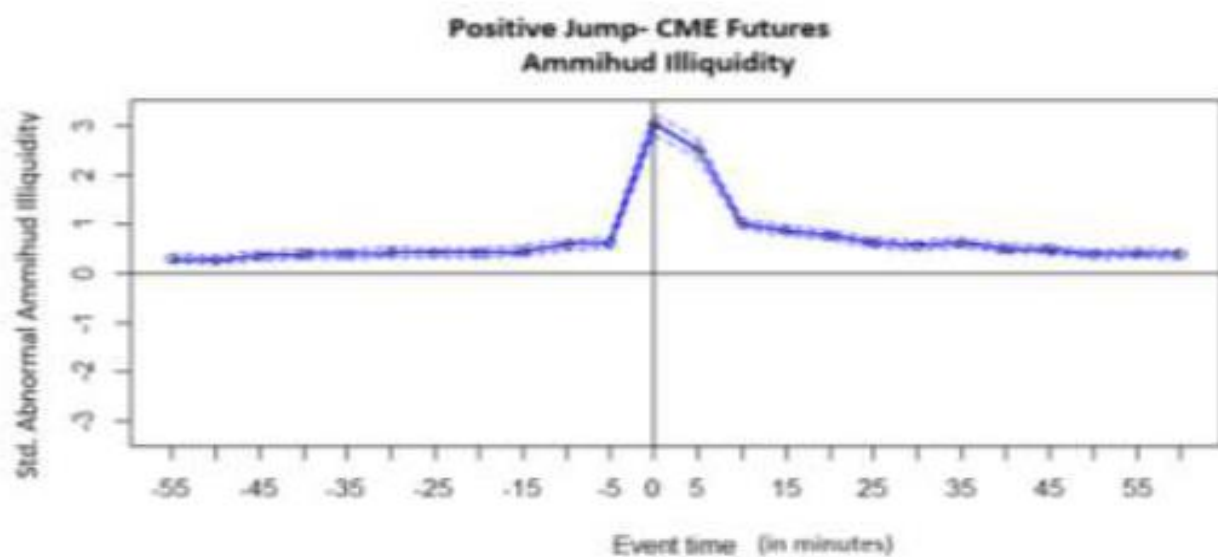


Fig 2(g). Ammihud Illiquidity around Positive Jump and Negative Jump



Empirical Findings :

Fig 2(i) News Attention around Positive Jump and Negative Jump

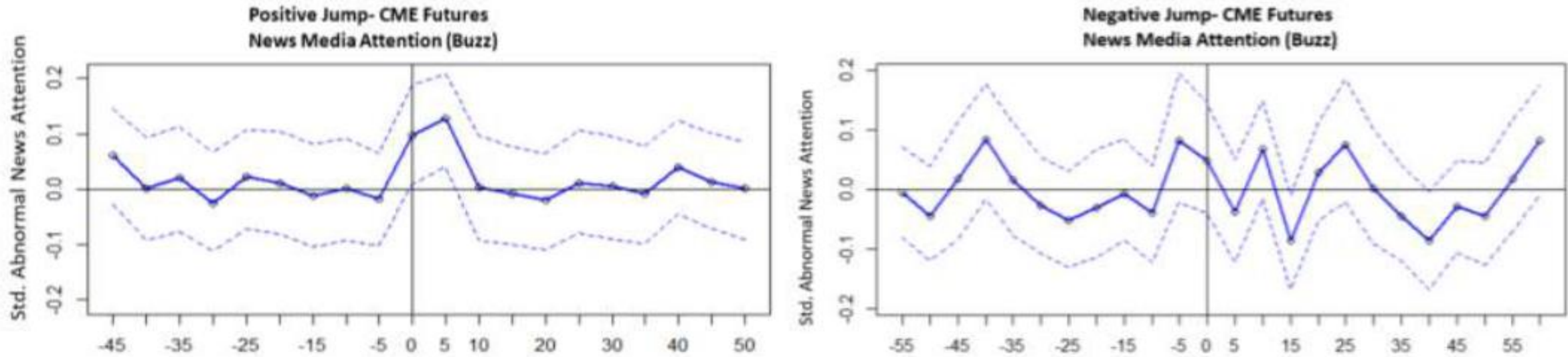


Fig 2(j). Social Media Attention around Positive Jump & Negative Jump

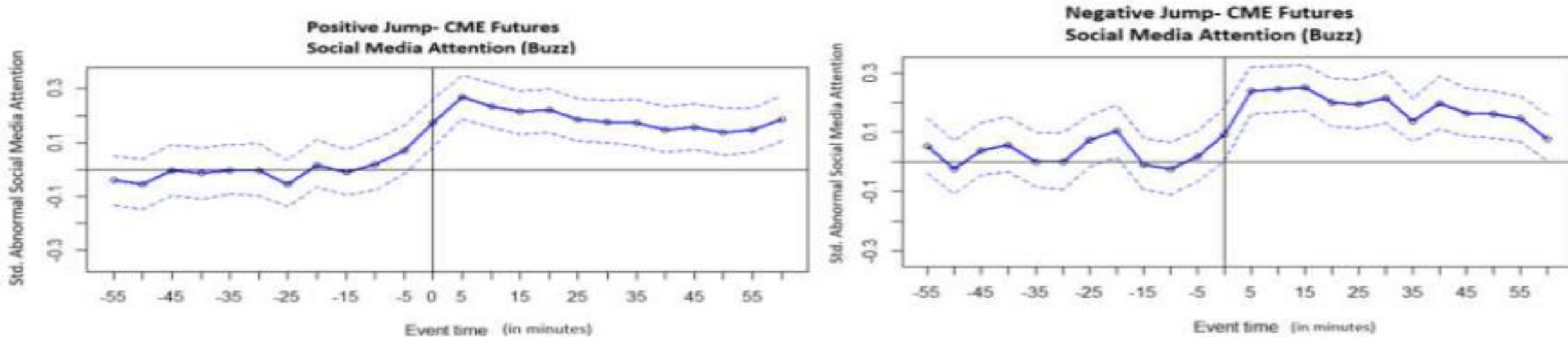


Fig 2(k). News Sentiment around Positive Jump and Negative Jump

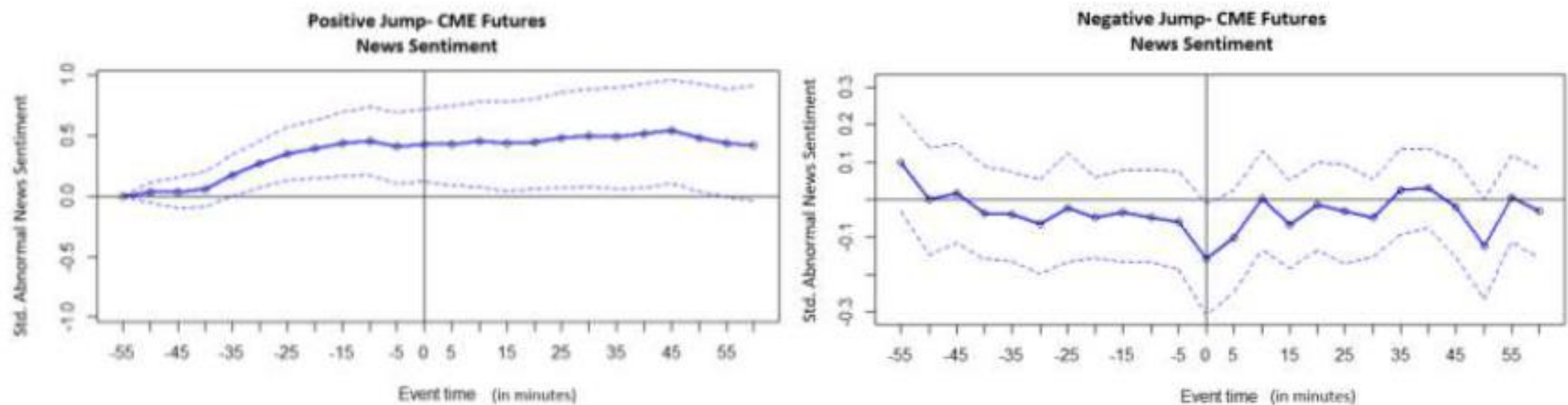


Fig 2(l). Social Media Sentiment around Positive Jump and Negative Jump

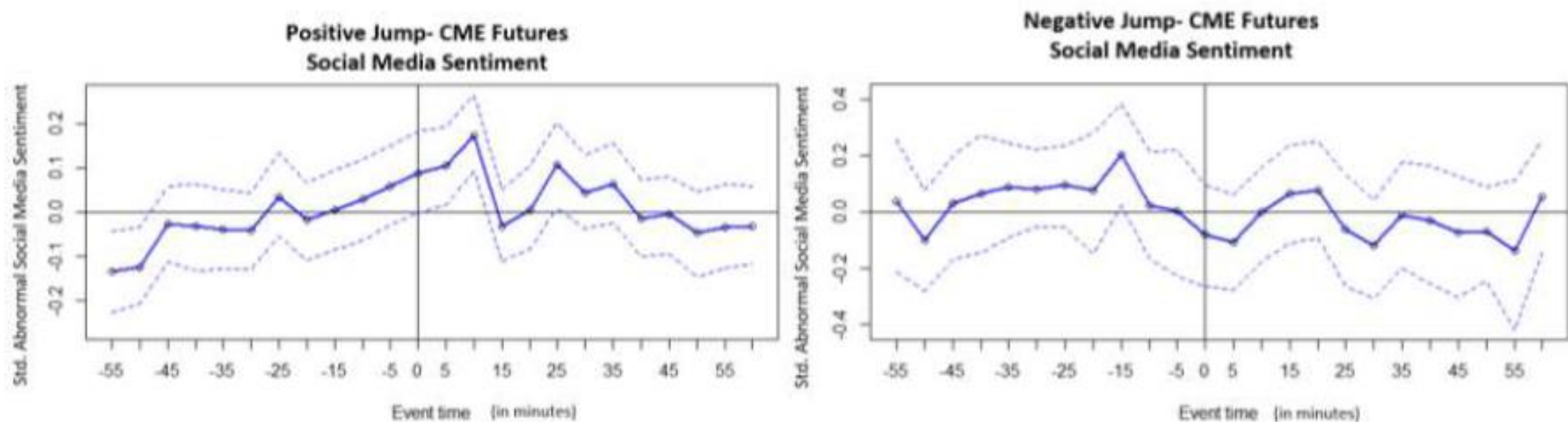


Fig 2(m). News Emotions around Positive Jump and Negative Jump

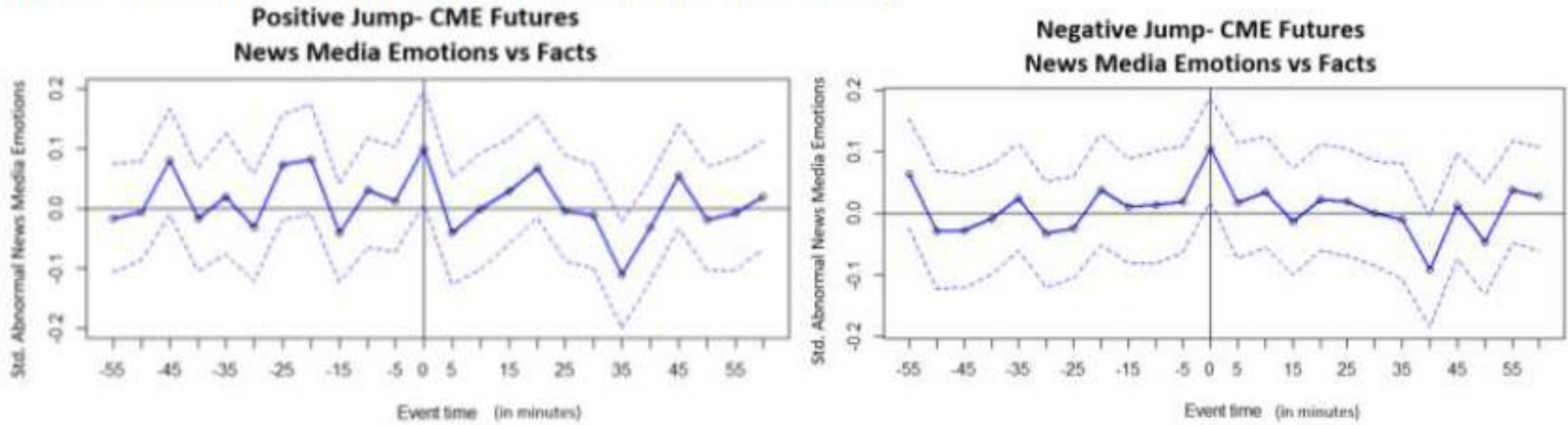
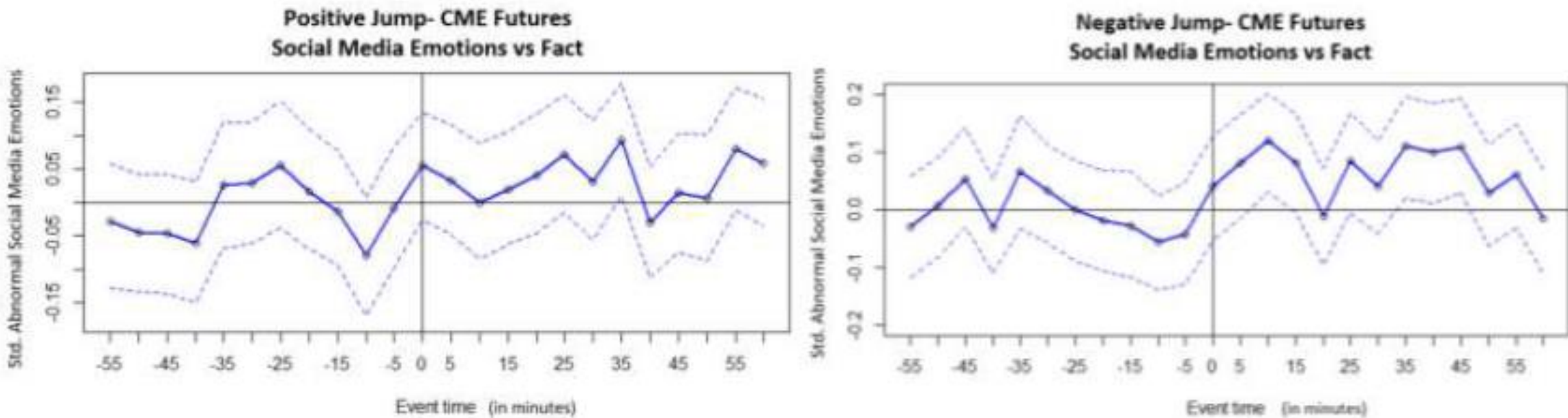


Fig 2(n) Social media Emotions around Positive Jump and Negative Jump



Empirical Approach

Logistic regression analysis of intraday price jumps determinants

$$P(\text{PriceJump}_t = 1 | X_{t-5min}) = G(\alpha_0 + \beta_1 \text{USAgg_SchMNews}_{t-5min} + \sum_{k=1}^2 \beta_{2,k} \text{Liq1_TradeActivity}_{k,t-5min} + \beta_3 \text{Liq2_TradeCost}_{t-5min} + \beta_4 \text{Liq3_PriceImpact}_{t-5min} + \beta_8 \text{Volatility}_{t-5min} + \varepsilon_t)$$

G is a logistic function of the form $G(z) = \frac{\exp(z)}{1+\exp(z)}$.

Empirical Findings : Price Jumps

| Predictor Variables | CME Gold Futures | | | Gold ETF SPDR | | |
|----------------------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|---------------------------|-----------------------------|
| | All Jumps | Positive Jumps | Negative Jumps | All Jumps | Positive Jumps | Negative Jumps |
| <i>USAgg_SchMacroNews</i> $t-5min$ | 1.59*** (10.93) | 1.493*** (8.45) | 1.727*** (5.553) | 1.103*** (7.94) | 1.476*** (6.88) | 1.0967*** (4.29) |
| <i>MarketPsych_Predictors</i> $t-5min$ | | | | | | |
| Attention_NewsMedia | 0.0071 (0.246) | -0.0255 (-0.80) | 0.007*** (1.88) | 0.0173 (0.874) | -0.0148 (-0.329) | 0.060* (1.632) |
| Sentiment_NewsMedia | -0.0492* (-2.04) | -0.012 (-0.41) | -0.0492** (-2.38) | -0.023* (-1.516) | -0.0052 (-0.115) | -0.0661* (-1.622) |
| Emotion_NewsMedia | 0.0045 (0.086) | -0.0018 (-0.027) | 0.0044 (1.066) | 0.0024 (0.045) | 0.0456* (1.536) | 0.050 (1.103) |
| Attention_SocialMedia | -0.0283 (-0.99) | 0.00561* (2.365) | -0.0283 (-1.25) | 0.0036* (2.166) | 0.0148* (1.70) | -0.048 (-0.83) |
| Sentiment_SocialMedia | 0.011 (0.40) | 0.0137* (1.542) | 0.0105 (0.175) | 0.024 (1.243) | 0.0498* (1.636) | 0.0254 (0.592) |
| Emotion_SocialMedia | -0.0126 (-0.384) | 0.0032 (0.087) | 0.0127 (1.419) | -0.027 (-1.326) | 0.005 (0.112) | -0.0751* (-1.686) |

Empirical Findings : Price Jumps

| Predictor Variables | CME Gold Futures | | | Gold ETF SPDR | | |
|-----------------------------------|----------------------|-----------------------|----------------------|-----------------------|-----------------------|-----------------------|
| | All Jumps | Positive Jumps | Negative Jumps | All Jumps | Positive Jumps | Negative Jumps |
| Liq1_TradingAct_Trades | 0.0859 (0.632) | 0.0149* (1.543) | 0.00085 (0.959) | 0.0678*** (3.43) | 0.066** (2.259) | 0.090** (2.848) |
| Liq2_TradingAct_Depth | 0.1389*** (4.04) | 0.088** (2.712) | 0.139*** (3.187) | 0.1012* (5.088) | 0.0758** (2.55) | 0.1508*** (4.23) |
| Liq3_TradingCost_EffSpread | 0.0186 (0.6578) | 0.046* (1.537) | 0.0186* (1.748) | 0.00669** (2.485) | 0.0079** (2.714) | 0.0053* (1.658) |
| Liq4_PriceImpact_OrderImb | -0.0022 (-0.077) | 0.0249* (1.957) | 0.002 (0.44) | 0.0153* (1.971) | 0.0074* (1.776) | -0.0257 (-1.009) |
| <i>Amm_Illiquidity</i> $t-5min$ | 0.014 (0.30) | 0.069** (2.36) | 0.0143 (0.089) | 0.0117 (1.358) | 0.0101 (0.477) | 0.0215* (1.792) |
| <i>Realised_Variance</i> $t-5min$ | 0.195*** (6.23) | 0.119*** (3.83) | 0.125*** (3.87) | 0.024* (1.62) | 0.0249** (2.96) | 0.0114* (1.606) |
| (Intercept) | -5.42*** (-170.4) | -6.113*** (-137.1) | -5.42*** (-141.3) | -5.334*** (-167.2) | -6.047*** (-133.6) | -6.049*** (-133.5) |
| No. of Observation | 2,34,326 | 2,34,326 | 2,34,326 | 2,09,467 | 2,09,467 | 2,09,467 |
| McFadden R ² | 4.4% | 3.1% | 3.2% | 2.9% | 1.7% | 3.1% |

Empirical Findings on Channel Mechanism 1

| Predictor Variables | CME Gold Futures | | | Gold ETF SPDR | | |
|-------------------------------------------------|----------------------------------|----------------------------------|---------------------------------|----------------------------------|----------------------------------|------------------------------------|
| | All Jumps | Positive Jumps | Negative Jumps | All Jumps | Positive Jumps | Negative Jumps |
| <i>Interaction Effects</i> $t-5min$ | | | | | | |
| <u>USAgg_SchNews</u> X <u>Attention_NewsM</u> | 0.0018 (0.119) | -0.0056 (-0.97) | 0.008* (1.642) | 0.098 (0.853) | 0.1986 (1.026) | 0.0952* (1.561) |
| <u>USAgg_SchNews</u> X <u>Sentiment_NewsM</u> | 0.14 (0.289) | -0.088 (-0.14) | 0.449 (0.83) | 0.078 (0.534) | -0.044 (-0.185) | 0.288 (0.929) |
| <u>USAgg_SchNews</u> X <u>Emotion_NewsM</u> | 0.801* (1.602) | 1.002* (1.559) | 0.55 (0.684) | 0.024* (1.71) | 0.163* (1.799) | -0.2658* (-1.340) |
| <u>USAgg_SchNews</u> X <u>Attention_SocialM</u> | 0.0029 (0.44) | 0.007* (1.84) | -0.027 (-1.399) | 0.0819 (1.092) | 0.639** (2.034) | 0.153 (0.89) |
| <u>USAgg_SchNews</u> X <u>Sentiment_SocialM</u> | 0.992* (1.72) | 2.173*** (3.49) | -0.765 (-0.63) | 0.038 (0.82) | 0.0371* (2.288) | -0.0506 (-0.133) |
| <u>USAgg_SchNews</u> X <u>Emotion_SocialM</u> | 0.869*** (3.10) | 0.908* (2.41) | 0.90* (2.02) | 0.0205* (2.088) | -0.0413 (-1.016) | 0.1099 (0.447) |

Empirical Findings : Price Jumps

Trading activity, trading cost, illiquidity, and volatility are at elevated levels 10-15 minutes prior to both positive and negative jumps, while buy-side order flow rises during positive price jumps.

News attention increases the predictability of negative price jumps and co-jumps, while social media attention to gold increases the predictability of positive jumps and co-jumps

Asymmetric effect of market sentiment as positive media sentiment predicts positive price jumps while negative media sentiment predicts negative price jumps.

News and social media emotions have a dominant and positive impact on jump and co-jump predictability during macroeconomic news announcements.

Which macroeconomic news causes price jumps in gold ?

| Predictor Variables | CME Gold Futures | | | Gold ETF SPDR | | |
|---------------------------------------------------------|----------------------------|-----------------------------|---------------------------|------------------------------|------------------------------|----------------------------|
| | All Jumps | Positive Jumps | Negative Jumps | All Jumps | Positive Jumps | Negative Jumps |
| <u>USDisagg_SchMacro_NewsSurp</u> <small>t-5min</small> | | | | | | |
| <u>US_FOMC_RateDecision_Surp</u> | 3.45*** (9.76) | 3.879* (10.09) | 2.10*** (3.38) | 0.0603*** (10.253) | 0.061*** (10.39) | 0.040*** (3.522) |
| <u>US_PersonalIncome_Surp</u> | . | . | . | . | . | . |
| <u>US_NonFarmPay_Surp</u> | 0.658** (1.927) | . | 0.879** (2.455) | . | -0.0628* (-4.28) | 0.0298** (2.765) |
| <u>US_RetailSales_Surp</u> | -0.73** (-2.187) | -1.1709* (-2.77) | . | . | -0.0182** (-2.676) | . |
| <u>US_GDPAdvance_Surp</u> | 1.84*** (4.287) | . | 2.22*** (4.69) | 0.0337*** (5.423) | -0.0414* (-2.944) | 0.046*** (4.251) |
| <u>US_IndusProd_Surp</u> | . | . | . | . | . | . |
| <u>US_CapacityUtil_Surp</u> | 0.674** (2.001) | . | 0.74** (2.34) | . | . | . |
| <u>US_ConsumerCredit_Surp</u> | . | -0.198* (-1.70) | . | . | . | . |
| <u>US_PersonalCons_Surp</u> | . | . | . | . | -0.0149* (-2.523) | . |
| <u>US_NewHomeSale_Surp</u> | -1.396* (-2.719) | -1.772*** (-3.18) | . | -0.0196** (-2.822) | -0.0266* (-3.363) | . |
| <u>US_DurableGoodSale_Surp</u> | . | -0.558** (-2.32) | 0.419** (2.633) | . | . | 0.0143* (2.727) |

Empirical Findings : Price Jumps

- **FOMC Rate Decision** is the most dominant and statistically significant US scheduled macroeconomic news.
- Followed by **Initial Jobless Claim and Unemployment**, which are common and significant predictors for positive and negative price jump and co-jumps
- **Positive price jumps and co-jumps** majorly driven by FOMC, Retail Sales, New Home Sales, Construction Spending, Initial jobless claim and Unemployment.
- **Negative price jump and co-jumps** in gold can be predicted by FOMC, Non-farm payroll, GDP Advance, Capacity Utilisation, Durable Goods, Consumer Confidence, PMI Manufacturing, Initial Jobless Claim and Unemployment

Empirical Findings : Co-Jumps

| Summary Statistics for Co-Jump | ALL COJUMPS | POSITIVE COJUMP | NEGATIVE COJUMP |
|--------------------------------|----------------|--------------------|--------------------|
| No. of Intraday Co-Jump | 863 | 426 | 437 |
| P(Co-Jump Day) | 41.79% | 20.63% | 21.16% |
| Average Co-Jump Size (%) | -0.002 | 0.355 | -0.350 |
| Median Co-Jump Size (%) | -0.093 | 0.313 | -0.291 |
| Max Co-Jump Size (%) | 1.593 | 1.593 | -0.082 |

Empirical Findings : Co-Jumps

Logistic regression analysis of intraday Co-jumps determinants

$$P(\text{CoJump}_t = 1 | X_{t-5min}) = G(\alpha_0 + \beta_1 \text{USAgg_SchMacroNews}_{t-5min} + \sum_{k=1}^5 \beta_{2,i} \text{COMEX_Liq}_{k,t-5min} + \beta_3 \text{COMEX_RV}_{t-5min} + \sum_{k=1}^5 \beta_{4,i} \text{ETF_Liq}_{k,t-5min} + \beta_5 \text{ETF_RV}_{t-5min} + \varepsilon_t)$$

G is a logistic function of the form $G(z) = \frac{\exp(z)}{1+\exp(z)}$.

| Predictor Variables | Co-Jumps | | |
|-------------------------------------------|----------------------------|---------------------------|-----------------------------|
| | All Jumps | Positive Jumps | Negative Jumps |
| US_AggSchMNews $t-5min$ | 0.277*** (9.23) | 0.263*** (8.14) | 0.175*** (8.033) |
| Market Psych Predictors $t-5min$ | | | |
| Attention_NewsMedia | 0.034* (1.163) | -0.009 (-0.433) | 0.028* (1.65) |
| Sentiment_NewsMedia | -0.026 (-0.829) | -0.00059 (-0.107) | -0.0243 (-0.097) |
| Emotion_NewsMedia | 0.070* (1.979) | 0.1093* (1.549) | 0.013 (1.219) |
| Attention_SocialMedia | 0.018** (2.322) | 0.0047 (0.542) | 0.0193* (1.983) |
| Sentiment_SocialMedia | 0.0048 (0.1483) | 0.018* (1.668) | -0.075* (-1.603) |
| Emotion_SocialMedia | 0.035 (1.05) | -0.0028 (-0.202) | 0.029 (0.61) |
| COMEX_LiquidityPredictors $t-5min$ | | | |
| Liq1_TradingAct_Trades | 0.0232*** (5.43) | 0.049** (2.82) | 0.0365*** (4.846) |
| Liq2_TradingAct_Depth | 0.068*** (2.445) | 0.040 (0.56) | 0.0618** (2.168) |
| Liq3_TradingCost_EffSpread | 0.0246 | 0.035* | 0.0114 |

Findings on Channel Mechanism : Market Psych dimensions

| Predictor Variables | Co-Jumps | | |
|-----------------------------------------------------|---------------------------------|-----------------------------------|-----------------------------------|
| | All Jumps | Positive Jumps | Negative Jumps |
| <i>Interaction Effects_{t-5mins}</i> | | | |
| <u>USAgg_SchNews</u> X <u>Attention_NewsMedia</u> | -0.0012 (-0.135) | -0.283 (-0.472) | 0.132* (2.207) |
| <u>USAgg_SchNews</u> X <u>Sentiment_NewsMedia</u> | -0.0056 (-0.091) | -0.136 (-0.988) | 0.0819 (0.310) |
| <u>USAgg_SchNews</u> X <u>Emotion_NewsMedia</u> | 0.0258* (1.85) | 0.067* (1.694) | -0.3786* (-1.64) |
| <u>USAgg_SchNews</u> X <u>Attention_SocialMedia</u> | 0.0052 (0.311) | 0.429* (1.522) | 0.190* (1.853) |
| <u>USAgg_SchNews</u> X <u>Sentiment_SocialMedia</u> | 0.0241 (1.037) | 0.1068** (2.976) | 0.1118 (0.318) |
| <u>USAgg_SchNews</u> X <u>Emotion_SocialMedia</u> | 0.032* (2.219) | 0.0718* (1.842) | 0.0036 (0.041) |

Empirical Findings : Co-Jumps

- US scheduled macroeconomic news announcements are the most dominant predictor of intraday co-jumps in gold markets.
- Liquidity aspects like trades and depth increases the predictability of co-jumps of either sign.
- Effective spreads widen during positive co-jumps in gold markets and realised volatility in COMEX futures positively impact the co-jumps

Empirical Findings : Co-Jumps

- *FOMC news surprise* has positive and statistically significant impact on all, positive and negative co-jumps between COMEX gold futures and ETF SPDR.
- Positive co-jumps in gold are driven by *FOMC Rate Decision, Non-Farm Payroll, GDP Advance, Retail Sales, New Home Sales, Durable Good Sales, Construction Spending, International Trade, Consumer Confidence, Initial Jobless Claim, and ISM Manufacturing.*
- Negative co-jumps in gold markets are predictable by *FOMC Rate Decision, Non-Farm Payroll, GDP Advance, Factory Order, CPI, PMI Manufacturing, Leading Index, and Unemployment.*

Conclusion & Implications

Concluding Remarks

Insights into the market microstructure of physical and derivative gold instruments traded across major gold markets.

Real time characteristics, drivers, and impact of intraday jump and co-jumps in global gold markets by using high frequency data sampled at 5-minutes

COMEX gold future experience greater number of intraday jumps as compared to SPDR Gold ETF

US scheduled macroeconomic news is the most dominant predictor of intraday price jumps and co-jumps.

Market Psych -News attention increases the predictability of negative price jumps and co-jumps while social media attention to gold increases the predictability of positive jumps and co-jumps.

Policy Implications

- Gold prices are more susceptible to negative price jumps or market crashes- reactionary nature of gold
- Portfolio allocation and diversification- indicates that there is exist a strong level of integration between gold futures and ETF - large number of co-jumps between the two
- Intraday traders can devise profitable trading strategies to predict gold price jumps by analysing the macroeconomic news announcements and surprises or a large increase in illiquidity.
- **Hedging Strategies and Risk Management**
- **Market Design issues**
- **Role of derivatives in tail risk management**

Thank You !