ESMA webinar: Social media influence on financial markets and crypto-assets trading

Economics, Financial Stability and Risk Department
ESMA webinar, 25 April 2024
Table of contents

1. Introduction
2. Social media sentiment impact on EU equity prices
3. Crypto assets: Market structures and EU relevance
4. Q&A
Motivation

Potential risks related to social media use

Investor protection

• Digitalisation: Huge social media expansion. As of April 2023, 4.8bn social media users globally or 60% of the total global population, spending on average about 2.5 hours per day on social media

• Social media boosted immediacy and convenience with which information spreads
  • This makes it appealing especially for individuals. Interactions on social media have increasingly been influencing investment and trading decisions…
  • …consumers are influenced and rely more and more on interactions with other amateur investors rather than seeking for expert advice (Chen and Xie, 2008)…
  • …increasing consumers’ exposure to large losses related to the possibility of receiving wrong or false information especially for less-informed investors or investors with limited means

• Potential for market abuse due to the scope of increased speculation

Orderly market

• Social media coupled with increased retail trading can have wider implications in terms of price dislocations

1 ESMA, October 2021, “ESMA Statement on Investment Recommendations on Social Media”
Focus on the EU…

- **Previous analysis - US focused:** Effects of social interactions on the financial decisions of individuals based on US related data (Ranco et al, 2015; Bailey et al., 2018; Sul et al., 2014)

…across social media networks and across time

- **First attempt across several social media sources, time and countries in the EU:**
  - Previous analyses mostly focused on a single social media (e.g. Twitter, Tan and Tas, 2020)
  - Data based on Stockpulse allows for an analysis:
    - at the broad EU level across countries and companies;
    - over a number of years and across social media (Twitter, Youtube, Instagram, etc.)
Overview
Social media sentiment matters in the short term

Research question
• Is social media sentiment linked to stock market dynamics?
  • Analysis on the correlation of social media sentiment and stock excess returns
  • Analysis focusing on whether the general interest in a particular stock is a factor that further contributes to a change in stock excess returns

Main findings
• Correlation between social media interactions and excess return at day t and day t+1
  • Very short-term nature of the effects. No indication of longer-term relationship
  • No significant gains from social media advices
Data and sample

Data used for the analysis

Sample

• Approximately 300,000 observations (from roughly 640,000 initial observations), covering 580 stocks of the STOXX600 equity index

Variables

• Social media (Stockpulse): Total number of messages (neutral, positive, negative);

• Stock market data (Refinitiv Eikon): Closing/open price; volatility; market cap

Period

• January 2019 – June 2023
Sample:

- Total social media messages mentioning Stoxx 600 constituents are highly volatile.
- Sudden peaks and drops in attention are mainly driven by individual stocks.
- Movements between price and sentiment not closely aligned at aggregate level.
Empirical analysis
Methodology

Methodology Panel regression with fixed effects

\[
\text{Daily excess returns}_{i,t} = \beta_0 + \beta_1 \text{sentiment}_{i,t} + \beta_2 \text{attention}_{i,t} + \beta_3 \text{sentiment}_{i,t} \times \text{attention}_{i,t} + \delta \text{Controls}_{i,t} + \alpha_i + u_i
\]

Where:

- **Daily excess returns**\(_{i,t}\) = Difference between stock and index (Stoxx 600) returns
- **Sentiment**\(_{i,t}\) = \(\frac{p - n}{t}\)
  - \(n\) = negative posts, \(p\) = positive posts, \(t\) = total messages (including neutral)
  - If ratio < 0, period of negative sentiment; period of positive sentiment otherwise
- **attention** = 1 if ISIN is in 90\(^{th}\) percentile of distribution of total messages on day \(t\)
  - For \(t, t+5, t+10\) we use sentiment at 5pm; for \(t+1\) we use social media sentiment at 5am
- **Controls** = CAR (cumulative return of stock \(i\) from \([t-n-5]\) to \([t-n-1]\)), size (log of daily market cap); illiquidity (Amihud indicator, mean of previous 5 days); market historical volatility (VSTOXX index, mean of previous 5 days)
### Results

#### Sentiment: short-term relevance

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sentiment [t-n]</strong></td>
<td>[t] $0.201^{***}$</td>
<td>[t+1] $0.0478^{***}$</td>
<td>[t+5] 0.00286</td>
<td>[t+10] -0.0074</td>
</tr>
<tr>
<td></td>
<td><strong>Attention [t-n]</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.147^{***}</td>
<td>-0.0482*</td>
<td>0.0175</td>
<td>-0.0435*</td>
</tr>
<tr>
<td><strong>Sentiment*Attention [t-n]</strong></td>
<td>0.684^{***}</td>
<td>0.0871</td>
<td>-0.0964*</td>
<td>0.018</td>
</tr>
<tr>
<td><strong>Controls</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>295,985</td>
<td>230,258</td>
<td>171,057</td>
<td>173,369</td>
</tr>
<tr>
<td><strong>ISINs</strong></td>
<td>580</td>
<td>581</td>
<td>579</td>
<td>579</td>
</tr>
</tbody>
</table>

* p<0.1, ** p<0.05, *** p<0.01

Note: Control variables include CAR, Amihud illiquidity measure, VSTOXX volatility index over the five previous days and company size. Results remain robust when excluding stocks driving the number of total messages and when adding time dummies to control for day of the week.

- Positive social media Sentiment is correlated with higher returns only in the short-term. It loses predictive power after $t+1$
- Same correlation exists for stocks receiving high attention compared to the rest of the sample. The effects are even more transitory (loss of predictive power after $t$)
- Trending stocks are associated on average with lower same day excess returns
Conclusion
Only transitory reaction

Investor protection

• Significant correlation between sentiment and excess returns in the short run, amplified by high overall attention for a given stock

• Social media activity does not lead to financial gains

• Not convenient for retail investors to predict and plan investment strategies based on social media advice

• Risk of investors excessively relying on information spreading on social media not necessarily related to fundamentals

• Increased exposure to risk of losses especially for investor with lower financial knowledge and resources

• Excessive risk taking (e.g. pump and dump strategies)
Discussion
Scope of the Supervisory Briefing

Promote, enhance and harmonise NCAs approaches in relation to:
(i) social media content analysis;
(ii) and ad-hoc or ongoing monitoring of social media*.

- Sharing Experience in monitoring of social media

Define a set of harmonised supervisory standards regarding compliance with MAR requirements applicable to any person producing or disseminating investment recommendation on social media

- assessment of investment recommendations and classification of the persons producing them

mitigate the risks of abusive activities such as insider trading and market manipulation

- raising awareness of possible market abuse practices which could take place through social media
State of play

• ESMA’s Market Integrity Working Group agreed to have a handbook for NCAs only and at the same time work on another document for the public:
  • The **Supervisory Briefing** has been included in the ESMA Handbook for NCAs
  • The **Warning** has been published on the ESMA's website together with a **short Video** shared via ESMA's social media channels
1. Introduction
2. Social media sentiment impact on EU equity prices
3. Crypto assets: Market structures and EU relevance
4. Q&A
Motivation
Understand structure of crypto trading

Crypto-asset market capitalisation
Volatile market growth

- Crypto markets are characterised by volatile growth cycles.
- ESMA mandate to ensure:
  i. consumer protection
  ii. orderly markets; and
  iii. financial stability.
- We monitor market developments, identify and warn about risks.
- This report is based on commercial data comprising granular off-chain trading and orderbook data.

Note: Market capitalisation of Bitcoin, Ethereum, Tether and other crypto-assets, in EUR bn.
Sources: CoinMarketCap, ESMA.
Crypto assets
Concentration and interconnectedness

Top-10 crypto assets by market cap
Highly concentrated...

<table>
<thead>
<tr>
<th></th>
<th>Market Cap</th>
<th></th>
<th>Trading Volume</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Billion USD</td>
<td>% Market Share</td>
<td>Billion USD</td>
<td>% Market Share</td>
</tr>
<tr>
<td>Bitcoin</td>
<td>850</td>
<td>51%</td>
<td>1,432</td>
<td>19%</td>
</tr>
<tr>
<td>Ether</td>
<td>268</td>
<td>17%</td>
<td>566</td>
<td>7%</td>
</tr>
<tr>
<td>Tether</td>
<td>236</td>
<td>6%</td>
<td>2,216</td>
<td>29%</td>
</tr>
<tr>
<td>Binance Coin</td>
<td>48</td>
<td>3%</td>
<td>41</td>
<td>1%</td>
</tr>
<tr>
<td>Solana</td>
<td>43</td>
<td>3%</td>
<td>101</td>
<td>1%</td>
</tr>
<tr>
<td>Ripple</td>
<td>31</td>
<td>2%</td>
<td>127</td>
<td>2%</td>
</tr>
<tr>
<td>USD Coin</td>
<td>25</td>
<td>2%</td>
<td>259</td>
<td>3%</td>
</tr>
<tr>
<td>Cardano</td>
<td>20</td>
<td>1%</td>
<td>29</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Dogecoin</td>
<td>12</td>
<td>1%</td>
<td>47</td>
<td>1%</td>
</tr>
<tr>
<td>Toncoin</td>
<td>8</td>
<td>&lt;1%</td>
<td>2</td>
<td>&lt;1%</td>
</tr>
<tr>
<td></td>
<td>1,660</td>
<td>86%</td>
<td>4,820</td>
<td>64%</td>
</tr>
</tbody>
</table>

Note: Top-10 crypto-assets as of December 2023 by market capitalisation and annual trading volume, in USD bn. Respective market shares in %.
Sources: CoinMarketCap, Kaiko, ESMA.

Crypto-asset correlations
... and interconnected market

<table>
<thead>
<tr>
<th></th>
<th>Bitcoin</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ether</td>
<td>0.82</td>
<td>1</td>
</tr>
<tr>
<td>Binance Coin</td>
<td>0.64</td>
<td>0.65</td>
</tr>
<tr>
<td>Ripple</td>
<td>0.56</td>
<td>0.56</td>
</tr>
<tr>
<td>Cardano</td>
<td>0.64</td>
<td>0.66</td>
</tr>
<tr>
<td>Solana</td>
<td>0.55</td>
<td>0.61</td>
</tr>
</tbody>
</table>

Note: Price return correlations of selected crypto-assets from January 2021 to December 2023.
Sources: Kaiko, ESMA.

• Three assets (BTC, ETH, USDT) account for ~75% of market cap and ~50% of trading volume (2023).
• Stablecoins are most liquid (relative to their market cap).
• High interconnectedness (positive correlations between 0.5 and 0.8).
Crypto assets
High stablecoin and low fiat volumes

Trading volume by asset pairs
High share of stablecoins

- Largest share in **crypto-stablecoin pairs (60%)** and relatively low share of **crypto-fiat pairs (20-30%).**
- Within stablecoins: **Tether** with ~70% **market cap** and ~80% of volume.
- Fiat-to-crypto shares: **USD and KRW** with 80%, **EUR** with 10%.
**Crypto exchanges**

**Market concentration in a few exchanges**

**Volume by exchange**

Binance market share receding

**Volume by exchange domicile**

Exchanges often domiciled in tax havens

- **Concentration of trading in a few exchanges.** In 2023, top-10 exchanges processed 90% of global volume, with an HHI greater than 2,500.
- **Binance remains the dominant platform,** although declining in 2023.
- **Most transactions executed on exchanges domiciled in “tax havens”**.

Note: Share of monthly trading volume (in USD) by exchange from 31/12/2020 to 31/12/2023. Sources: Kaiko, ESMA.

Note: Share of monthly trading volume (in USD) by geographic location of the exchange headquarter. Headquarter location manually identified from publicly available sources. Sources: Kaiko, ESMA.
Crypto exchanges
Largest exchanges offer highest liquidity

Bid/ask spreads for Bitcoin
Spreads very low at largest exchanges

<table>
<thead>
<tr>
<th>Exchange</th>
<th>Bid/Ask Spread</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binance</td>
<td></td>
</tr>
<tr>
<td>OKX</td>
<td></td>
</tr>
<tr>
<td>Coinbase</td>
<td></td>
</tr>
<tr>
<td>Huobi</td>
<td></td>
</tr>
<tr>
<td>KuCoin</td>
<td></td>
</tr>
</tbody>
</table>

Market median

Note: Distribution of bid-ask spreads for selected crypto-asset exchanges. Bid-ask spreads measured as the difference between the lowest ask-price and the highest bid-price, divided by the mid-price. Data covering BTC-USDT, BTC-USDC and BTC-USD trading pairs from May to December 2023, in basis points.
Sources: Kaiko, ESMA.

Spreads vs volume on Binance
BTC and ETH with lowest spreads

Note: Median bid-ask spreads in basis points (x-axis) vs annual trading volume in billion USD (y-axis) for selected crypto-assets on Binance. Bid-ask spreads collected from May to December 2023.
Sources: Kaiko, ESMA.

- Larger exchanges tend to have superior liquidity (spreads and depth).
- BTC and ETH are more liquid than other assets.
- Consistent with market concentration in a few assets and exchanges.
Conclusion

A concentrated and volatile market

- Crypto assets are **highly volatile and strongly interconnected**. They tend to co-move with equity markets.

- The crypto market is **highly concentrated, both at the asset and exchange level**. This is also true for market liquidity.

- **Fiat involved in 20-30% of transactions** (most used: USD and KRW).

- **Stablecoins in over 60% of transactions**. But frequent deviations from their peg and Tether with >70% market share.

- It is **difficult to identify the origin of order flow or location of trading**. Most crypto exchanges are domiciled in “tax havens”.

ESMA will continue monitoring the crypto-asset market going forward!
Discussion

The crypto heatmap

BTC
$60,965.90
▼ 1.98%

Dominance: 53.91%
Discuss which value proposition?

<table>
<thead>
<tr>
<th>Market cap (USD bn)</th>
<th>Description / Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bitcoin</strong> (Meta 1,245bn)</td>
<td>1,299 On-line payment without going through a financial institution</td>
</tr>
<tr>
<td><strong>Ethereum</strong> (Axa 84bn)</td>
<td>Global platform for decentralized applications</td>
</tr>
<tr>
<td><strong>BNB</strong> (Axa 84bn)</td>
<td>90 Bring new edge finance to the world, become the infrastructure services provider for the entire blockchain ecosystem</td>
</tr>
<tr>
<td><strong>Solana</strong> (Axa 84bn)</td>
<td>69 Open source project to facilitate decentralized applications creation</td>
</tr>
<tr>
<td><strong>XRP</strong></td>
<td>30 Open-source, permissionless and decentralized technology for payments, tokenization, DeFi, CBDCs and stablecoins</td>
</tr>
<tr>
<td><strong>Dogecoin</strong> (Societe Generale 22bn)</td>
<td>23 Fun, light-hearted cryptocurrency, with greater appeal beyond Bitcoin’s core audience, since it was based on a dog meme</td>
</tr>
<tr>
<td><strong>Toncoin</strong> (Generale 22bn)</td>
<td>20 Decentralized layer-1 blockchain, easy-to-use application that allows users to buy/send/store funds</td>
</tr>
<tr>
<td><strong>Cardano</strong></td>
<td>18 Proof-of-stake blockchain platform focused on building a scalable, secure and efficient decentralized network</td>
</tr>
<tr>
<td><strong>Shiba Inu</strong></td>
<td>16 Global stable currency that plebs across all countries are able to use as both a store of value and method of payment</td>
</tr>
<tr>
<td><strong>Avalanche</strong></td>
<td>14 Layer one blockchain that functions as a platform for decentralized applications and custom blockchain networks</td>
</tr>
</tbody>
</table>
Areas for further research

- On-chain data
- MiCA’s implementation in the EU
- Decentralised exchanges
- Tokenisation
Table of contents

1. Introduction
2. Social media sentiment impact on EU equity prices
3. Crypto assets: Market structures and EU relevance
4. Q&A