Bitcoin and News Around the World in Twenty-Six Languages

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Contents

Problem definition

- Cryptocurrencies are famous for their high volatility
- Price discovery “noisy” for cryptos wrt other asset classes
- Is volatility driven by fundamentals or by other factors
- → **What is the role of sentiment in news for cryptos pricing**

The data

- Time span: April 16, 2014 to August 31, 2020
- Sentiment score of news extracted from a large variety of sources and languages, from EC's Europe Media Monitor
- High frequency data on BTC quotes from Kaiko

The data: Europe Media Monitor (EMM) (1)

- EMM newsbrief: automatic system that collects and analyses news
- Monitors a list of news media sources, in up to 72 languages
- Sources include most major online newspapers and news outlets, and a set of specialised outlets
- Generates structured meta-data (entities, events, categories …)
- Calculates a sentiment/tonality score
  - "JRC tonality" algorithm. Bag of words. +/- 1 for slightly positive/negative terms, +/- 4 for strongly positive/negative terms. Normalized by word count.

The data: Europe Media Monitor (EMM) (2)

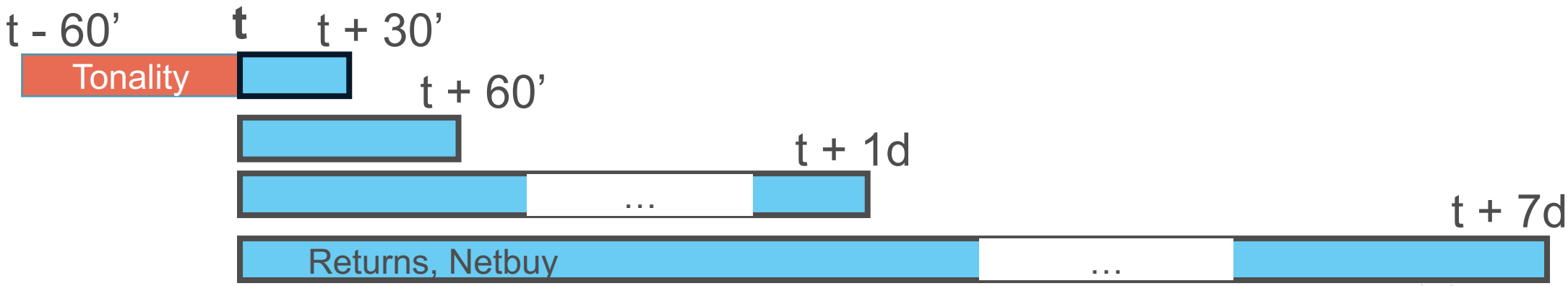
- Articles belonging to “Bitcoin” category (inclusion based on appearance of keywords and semantic criteria determined by subject matter experts).
- 403,112 articles in 26 languages (184,354 of which in English).
- **UTC Time-stamp** (retrieval)
- **Language (English/Other)**
- **Tonality**

The data: Price data (1)

- **Returns**
- **Netbuy**
- 6 exchanges in different regions
  - three in Asia (OkCoin in China, Bitfinex in Hong Kong, and Quoine in Japan), one in Europe (Bitstamp in Luxembourg), and two in US (Coinbase and Kraken).
- Criteria:
  - Trading history to match with our EMM sample period
  - High enough trading volume to alleviate liquidity issues.

Methods:

- Divide every day in 24 1-hour time intervals t. (t = 0 : 23)
- Calculate average tonality over period (t-1hr:t) for English, and all other
  - Retain all intervals with articles both in English and other languages
  - About 30 thousand 1-hr time intervals (67% of available)
- Calculate returns and netbuy of periods (t:t+k), where k = 30', 60', 1d, 7d



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Methods:

Logistic regression of SIGN of Returns and Netbuy over 30', 60', 1d, 7d after each 1-hour tonality measurement period on tonality of news and controls

$$\text{Sign}(\text{Ret}_{t+k}) = \text{Logistic}(\alpha + \beta_1 \text{TonalityEN}_t + \beta_2 \text{TonalityOT}_t + \gamma \text{Controls}_t + \epsilon_{t+1})$$

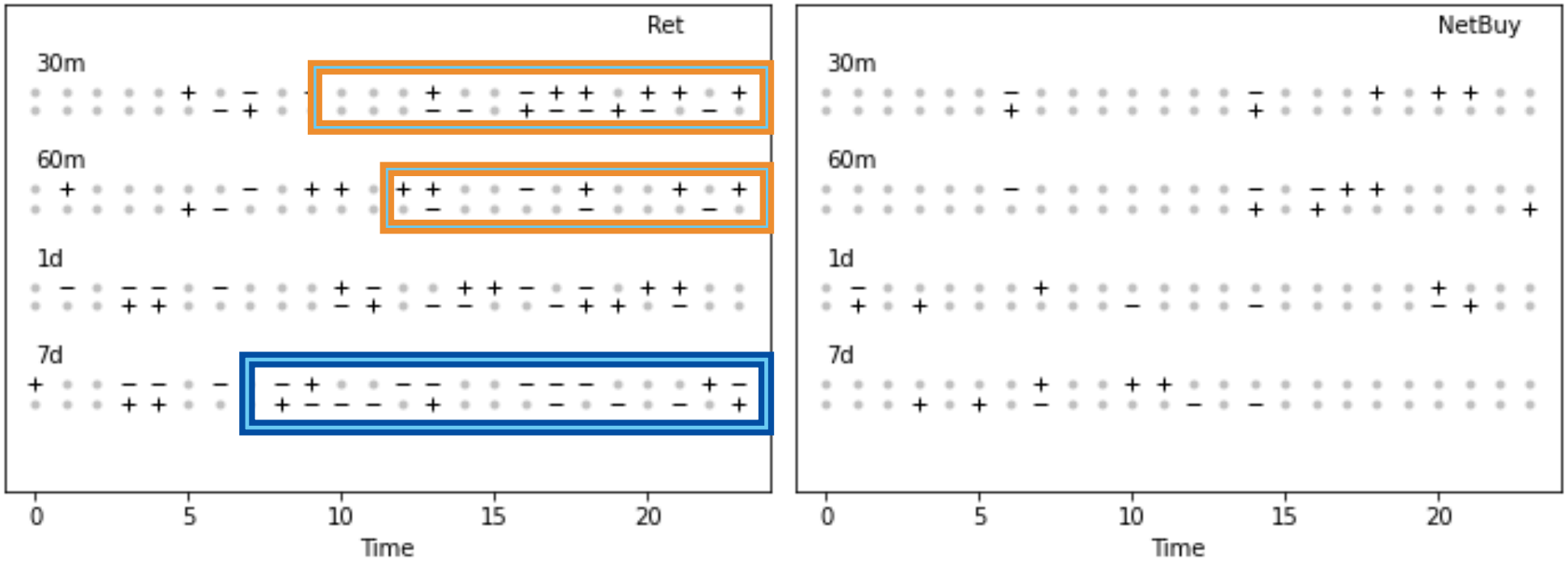
$$\text{NetBuy}_{t+k} = \alpha + \beta_1 \text{TonalityEN}_t + \beta_2 \text{TonalityOT}_t + \gamma \text{Controls}_t + \epsilon_{t+1}$$

- Ret(t+k) and NetBuy (t+k) with k = 30', 60', 1d, and 7d, starting from the end of **1h** interval t.
- TonalityEN(t)/OT(t) average tonality of English/Other languages news over **1h** interval t.
- Controls include a macroeconomic sentiment index constructed by the FED San Francisco.
- Estimated **pooled**, with **fixed effects** by Exchange and with **different slopes** by exchange
- Mainly interested in the **SIGN** of significant coefficients for news sentiment in EN and OT

Results: returns and netbuy (pooled and FE)

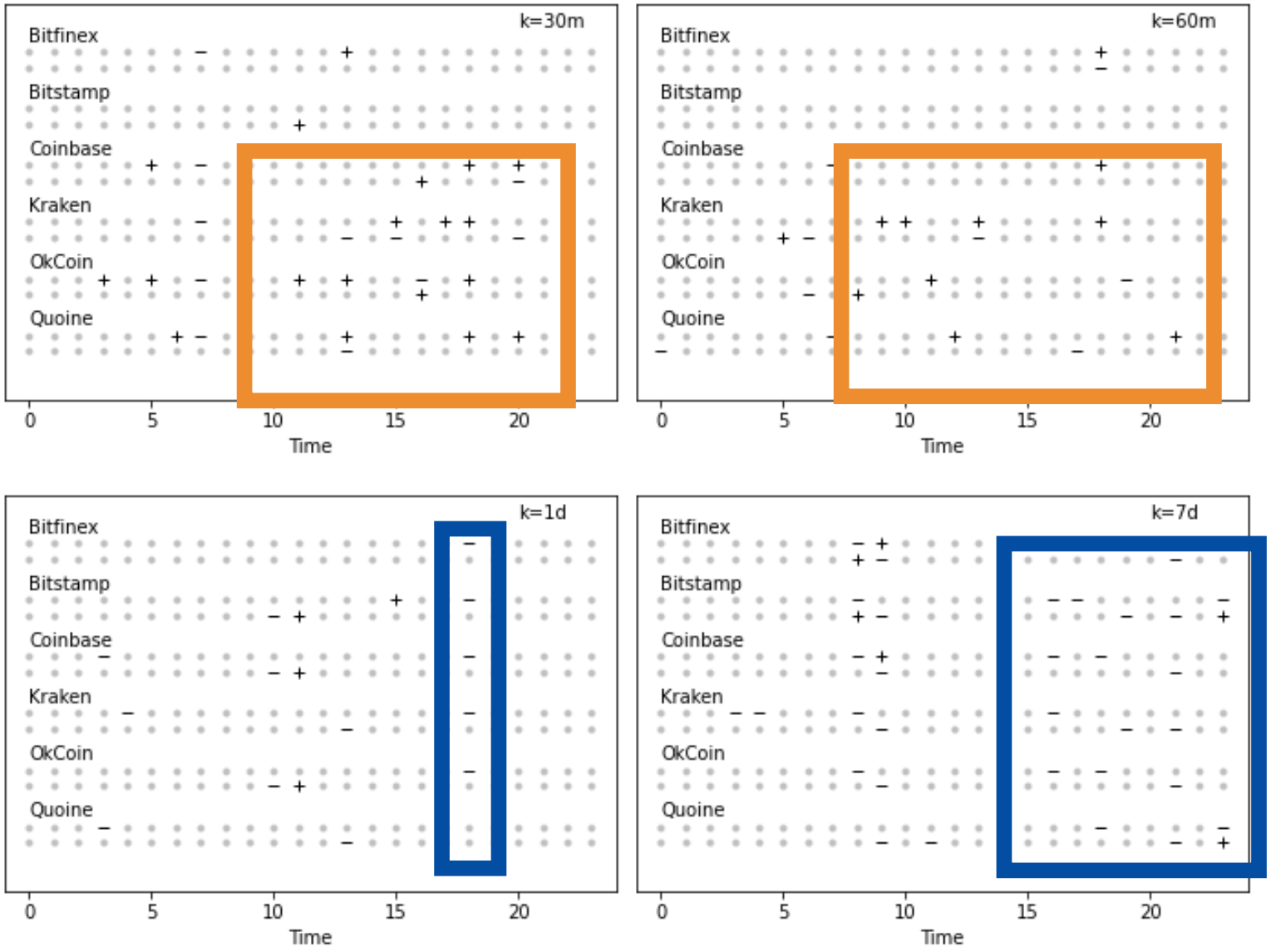
β_1 (EN)

β_2 (OT)



- 24 time slots; **+**, significant, positive; **-** , significant, negative; top line (EN), bottom line (OT)
- On average, returns positively correlated with EN news tonality at short time intervals, and negatively correlated at the longest time interval
- Netbuy volume more muted relation.

Results: returns (by exchange)



- On average, returns positively correlated with news tonality at short time intervals, and negatively correlated at the longest time interval
- For bitfinex and Bitstamp short term relationship disappears

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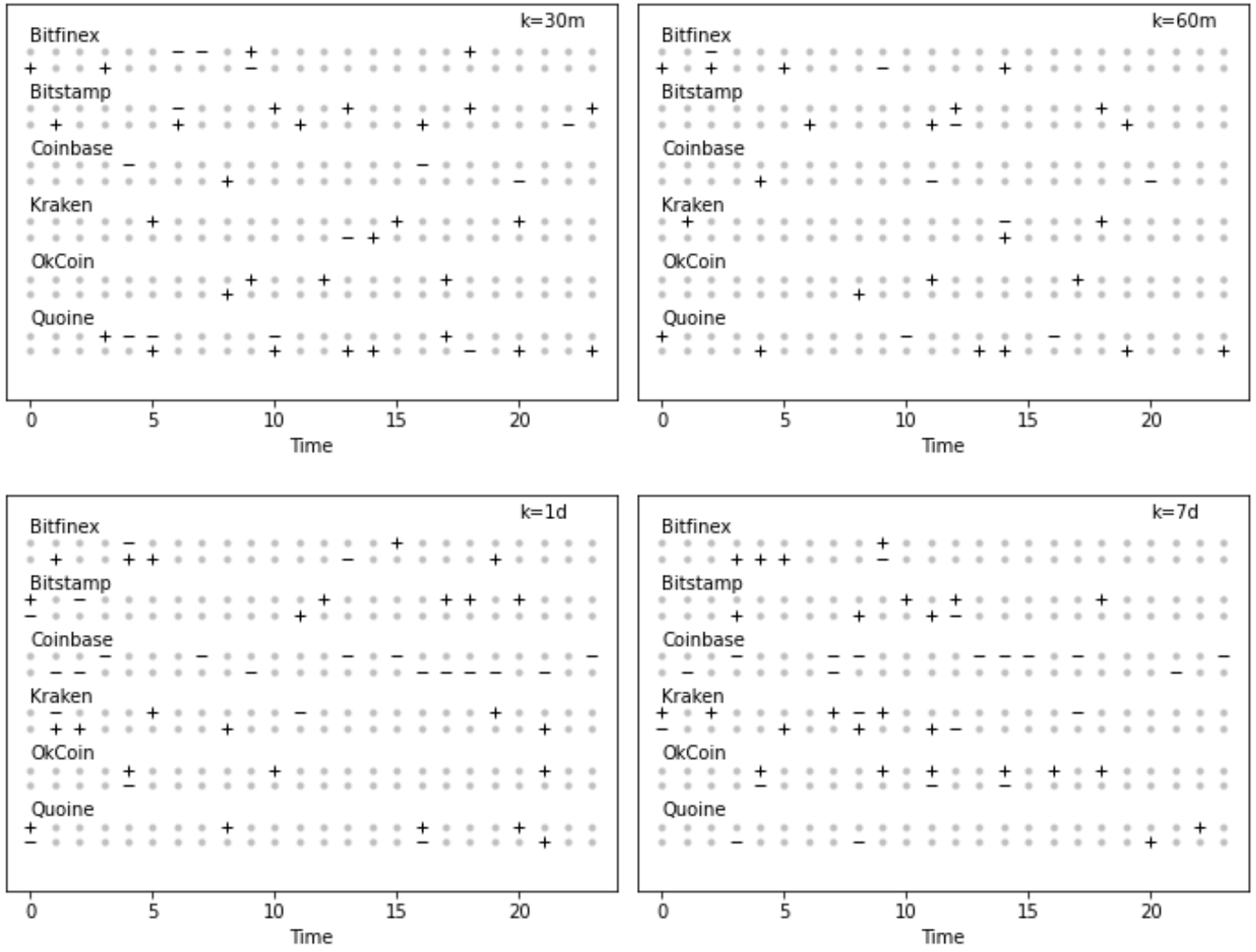
Results: netbuy (by exchange)



- More significant coefficients when exchange specific intercepts are allowed
- Some exchanges seem to have a prevalence of one sign … artefact or …

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Conclusions:

- Positive correlation between tonality of news articles in English and return on BTC over the next 30’ and 60’
- agree with previous research pointing to a role for sentiment in determining returns in crypto-currencies, and with the fact that news sentiment could affect short term and intraday returns
- evidence of a reversal of these effects over longer time horizons, especially 7 days . This is suggestive of the fact that these dynamics could be tied to extensive noise trading on BTC markets.
- further supported by the analysis of results at individual exchange level, where the effects seems to disappear on Bitfinex, which is reportedly a more efficient BTC exchange.
- NetBuy dynamics more muted at aggregate level, but different exchanges seem to respond more to news.

Further research:

- Relationships seems to be inverted for non-English language news. This result could point to a different use of news by noise traders in different countries, or to the existence of dynamics in news tonalities across different languages and will need to be investigated further.

- Netbuy dynamics might be compatible with interest and noise driven dynamics, and/or with different roles for different exchanges, or BTC trading for other purposes

- Subject of further investigation to understand if more extreme cases of market “one sidedness” could be the object of prediction.

- Introduce social media sentiment (e.g. Reddit, Twitter) …

Thank you

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The data: Europe Media Monitor (EMM) (3)

Table 1: Summary Statistics of Tonality

Hourly Block	TonalityEN	TonalityOT	Hourly Block	TonalityEN	TonalityOT
0	-2.638	-0.119	12	-1.186	0.357
1	-3.408	0.364	13	-1.182	0.385
2	-3.259	0.022	14	-1.592	0.337
3	-3.226	0.218	15	-1.945	0.251
4	-2.596	0.232	16	-1.661	0.257
5	-2.023	0.511	17	-2.152	0.294
6	-2.246	0.495	18	-2.285	0.026
7	-2.274	0.432	19	-2.134	-0.104
8	-1.839	0.445	20	-2.563	0.275
9	-1.626	0.458	21	-2.451	-0.061
10	-1.797	0.476	22	-2.868	0.033
11	-1.860	0.866	23	-3.029	0.139
			All	-2.164	0.292

Notes: Entries to the table are the average tonality of all hourly time blocks.

The data: Price data (2)

Table 2: Summary Statistics of Return and NetBuy

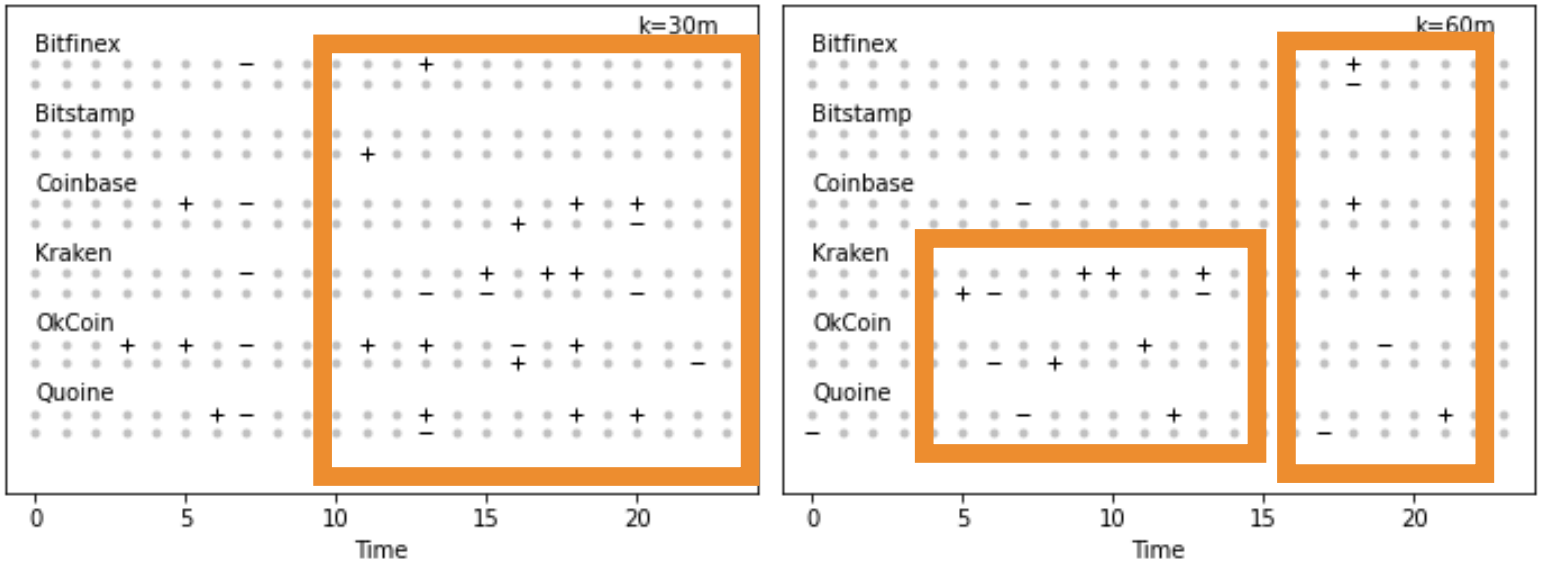
	Ret							
	30 mins		60 mins		1 day		7 days	
	N	Mean	N	Mean	N	Mean	N	Mean
Bitfinex	30148	2.68E-05	30146	7.84E-05	30098	1.75E-03	29930	0.016
Bitstamp	30103	2.29E-05	30100	8.15E-05	30036	1.85E-03	29802	0.017
Coinbase	28479	9.80E-06	28463	6.81E-05	28360	2.22E-03	28237	0.018
Kraken	29439	3.12E-05	29369	5.56E-05	28989	2.02E-03	28795	0.017
OkCoin	26106	7.20E-05	26091	6.93E-05	25943	1.52E-03	25621	0.014
Quoine	27257	-8.95E-05	27167	6.27E-05	26681	2.39E-03	26519	0.019

	NetBuy							
	30 mins		60 mins		1 day		7 days	
	N	Mean	N	Mean	N	Mean	N	Mean
Bitfinex	29934	-0.004	30061	-0.009	30150	-0.020	30140	-0.023
Bitstamp	25893	0.074	25897	0.073	25976	0.054	26090	0.048
Coinbase	28363	0.084	28388	0.078	28638	0.068	28604	0.063
Kraken	27407	0.009	28041	0.003	30143	-0.011	30153	-0.017
OkCoin	25120	-0.055	25615	-0.056	26240	-0.068	26439	-0.061
Quoine	24189	-0.028	25379	-0.034	28347	-0.019	28977	-0.019

Notes: Entries are the statistics of Ret_{t+k} and $NetBuy_{t+k}$ for k =30 mins, 60 mins, 1 day and 7 days.

Results: returns (by exchange – 30’ and 60’)

Table 5: Tonality Predicts Homogeneous Future Returns at Different Exchanges.



- On average, returns positively correlated with news tonality at short time intervals, and negatively correlated at the longest time interval
- Netbuy volume more muted relation.

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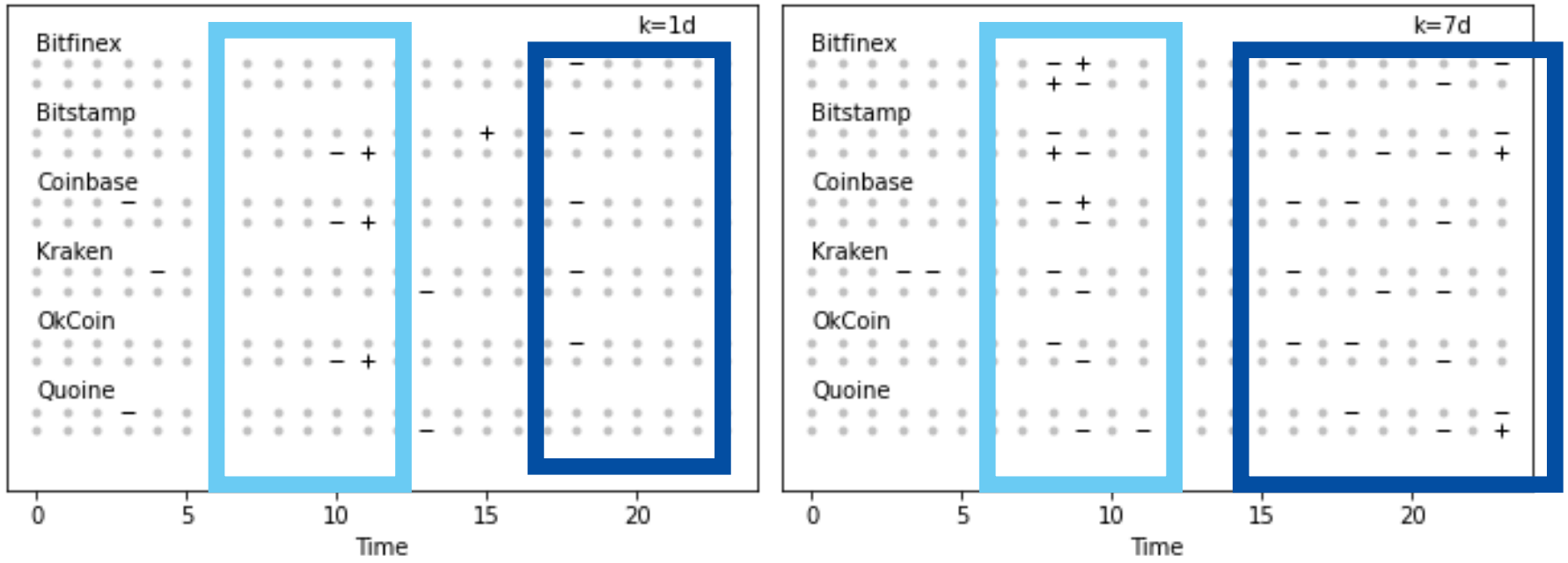
Results: returns (by exchange – 1d and 7d)



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