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# A Time Series Analysis of Emotional Loading in Central Bank Statements

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## Motivation

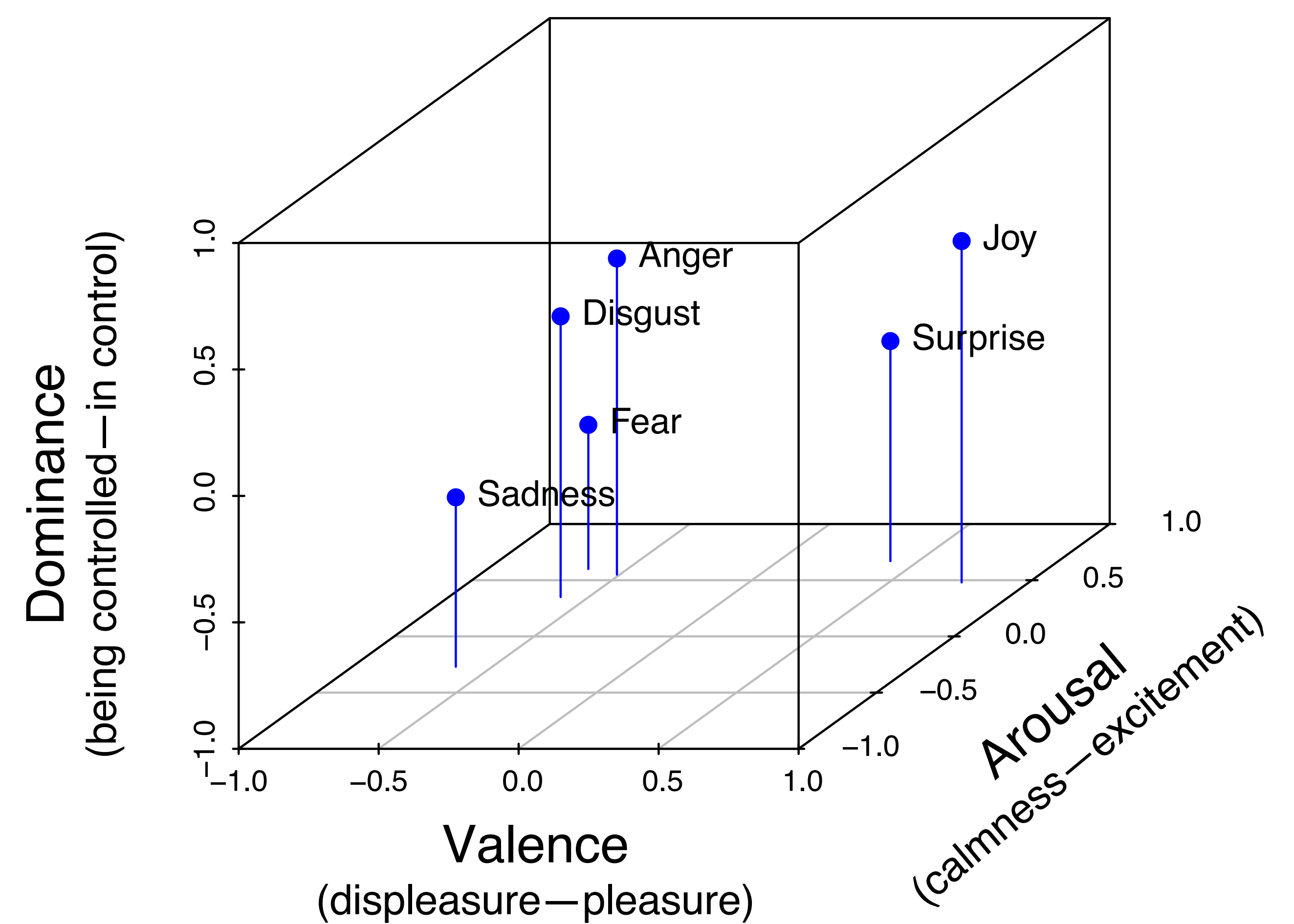
- Central bank communications (CBC) are increasingly important for the international economy
- Are there emotions in CBC and, if so, how do they relate to the state of the economy?
- Focus on Europe (ECB) and US (Fed)

## Data

- Web-scraped from ECB/Fed Web sites
- 1998 – June 2019
- ECB: 230 docs
- Fed: 181 docs

*Compared with the March 2019 ECB staff macroeconomic projections, the outlook for real GDP growth has been revised up by 0.1 percentage points for 2019 and has been revised down by 0.2 percentage points for 2020 and by 0.1 percentage points for 2021. The risks surrounding the euro area growth outlook remain tilted to the downside, on account of the prolonged presence of uncertainties, related to geopolitical factors, the rising threat of protectionism and vulnerabilities in emerging markets.*

## Valence-Arousal-Dominance (VAD)



## VAD Analysis of Central Bank Communication

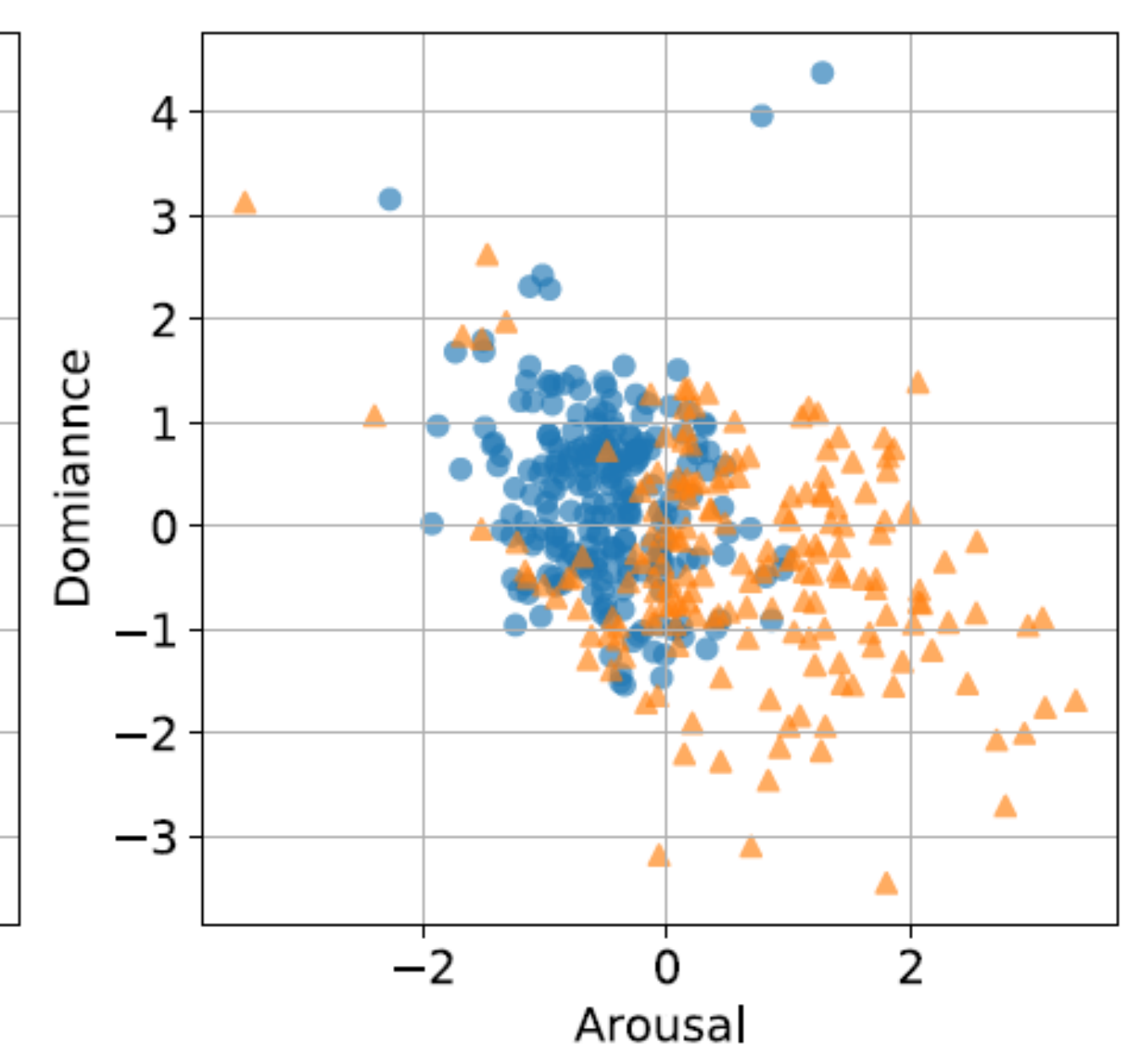
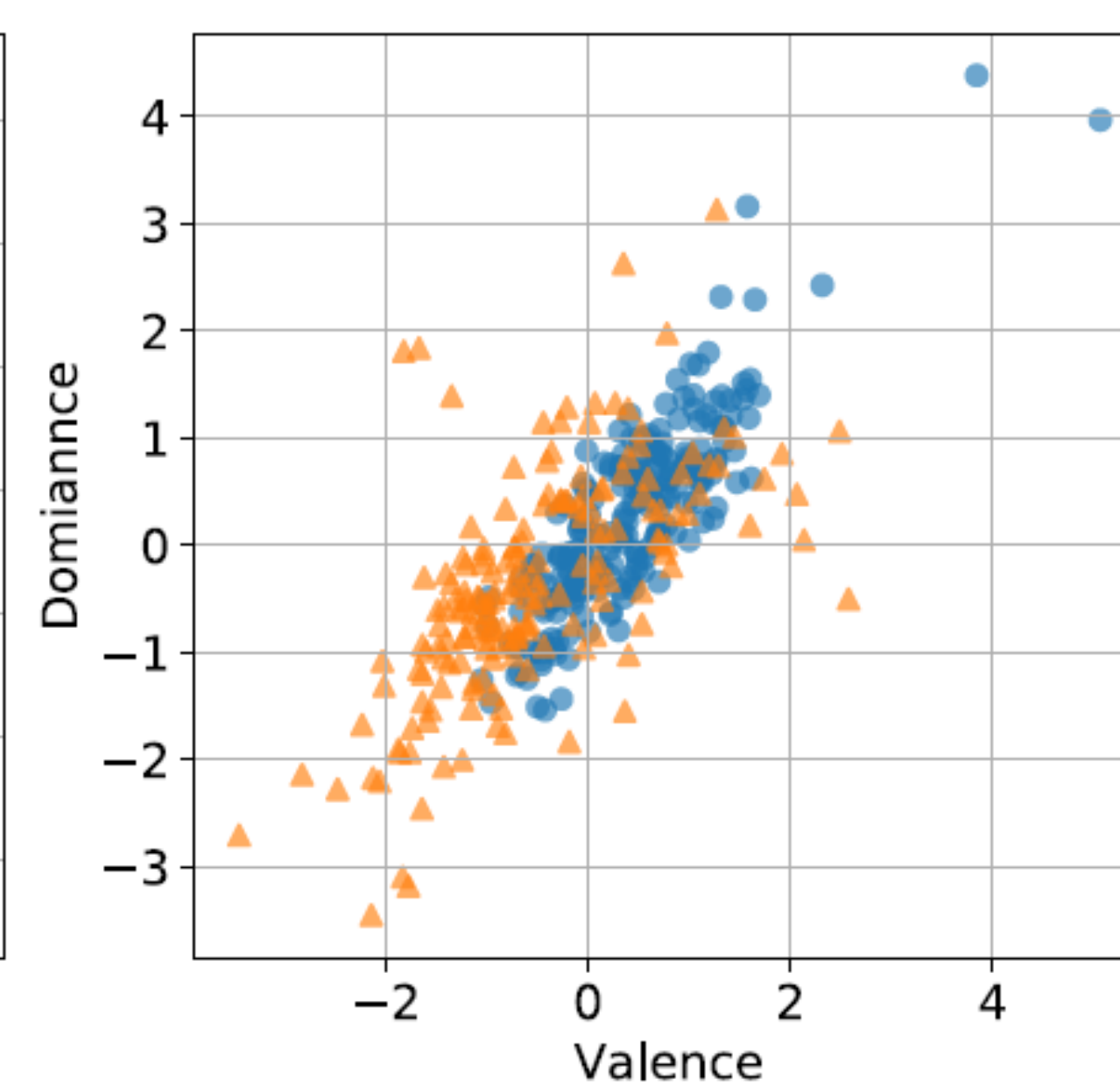
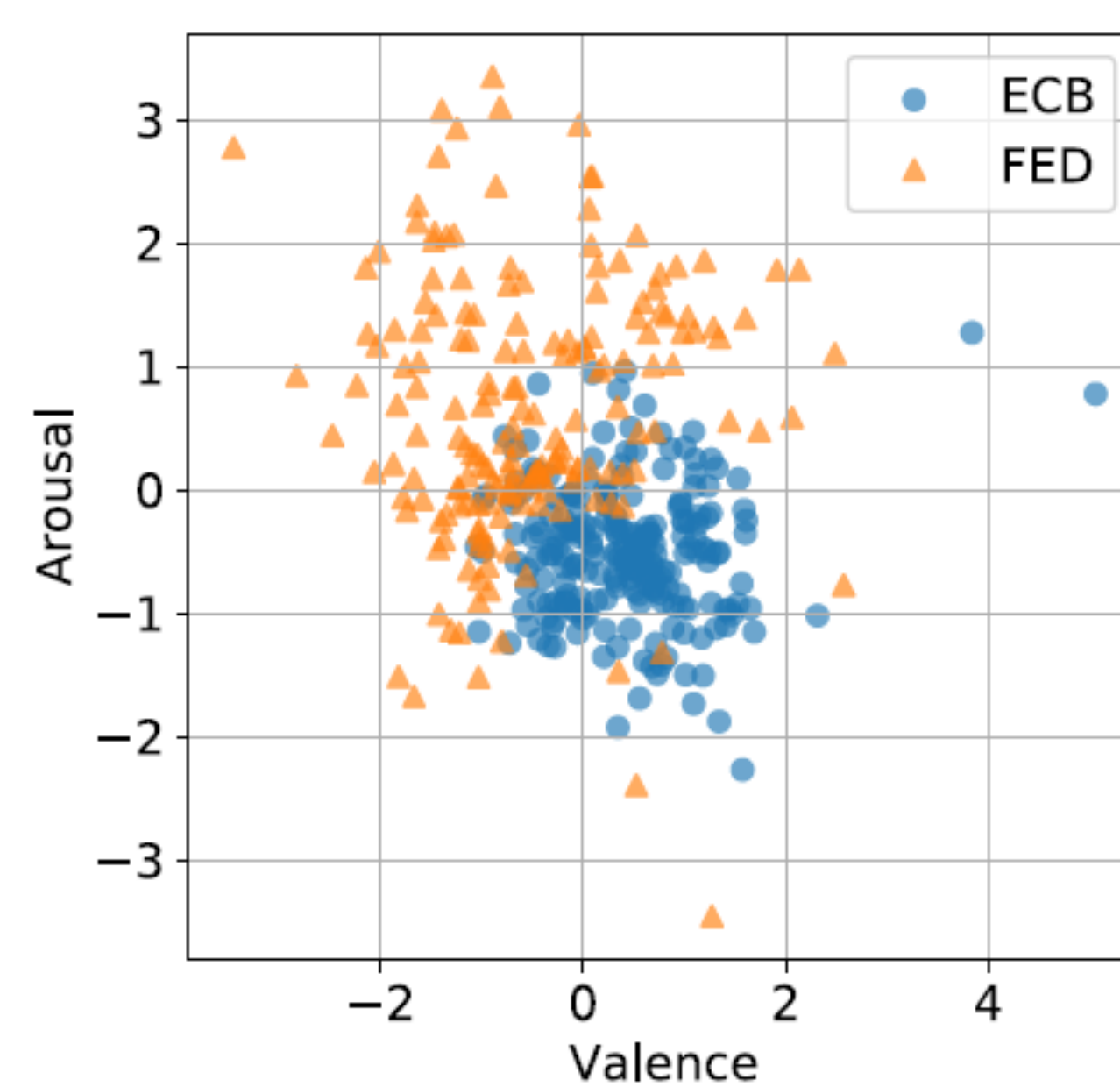
### Methodology

Jena Emotion Analyzer (JEmAS)  
(Buechel & Hahn, ECAI 2016)

$$\bar{e}(d) := \frac{\sum_{w \in d} \lambda(w, d) \times e(w)}{\sum_{w \in d} \lambda(w, d)}$$

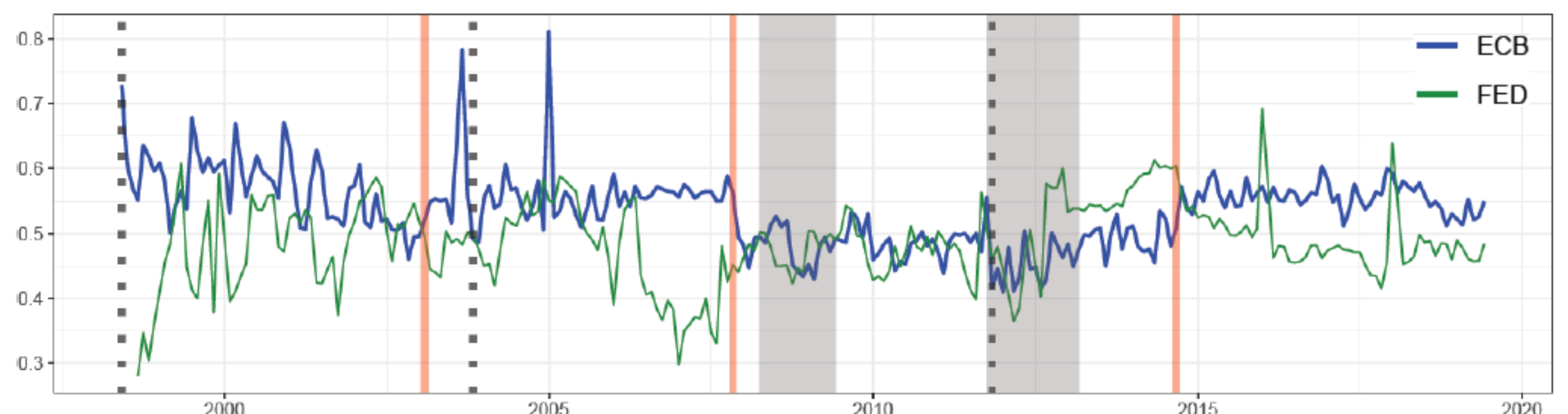
### ECB vs. Fed Emotions

- Distinct emotional profiles
- Lower Valence and Dominance but higher Arousal for Fed



### CBC Emotions Change over Time

- Breakpoint analysis shows that break dates (orange lines) often coincide with
  - Changes in presidency (dotted lines)
  - Recession periods (shaded areas)



## Correlation of VAD Data with Economic Indicators

		production	inflation	unemploy.	services
ECB	V	0.32	0.19	-0.45	0.42
	A	-0.11	0.24	-0.34	-0.23
	D	0.24	-0.12	-0.32	0.53
Fed	V	0.04	-0.03	0.00	0.07
	A	0.05	0.52	-0.56	0.12
	D	-0.03	-0.17	0.10	-0.03

## Conclusion

- CBC shows emotional loading
- ECB and Fed show distinct emotional profiles
- Emotion in CBC changes over time
- Preliminary evidence that changes in emotion relate to the state of the economy and respective central bank president in office