A Study on Regime Shift in Major Stock Market during COVID-19

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# Outline - This presentation is in two parts.

	Speaker	Outline
1st	Motoharu Yokoyama	The 1st part of the presentation will review the stock market in 2020. The content is as follows • Stock market performance in 2020 • Impact of Covid-19 on the economy • Relationship between business cycle and stock market
2nd	Noriyuki Shimoyama	The 2nd half of the presentation includes: • Applying a methodology introduced at ICA2023, we analyse major stock indices, the S&P500, STOXX600, and TOPIX and identify four typical regimes for the recovery process during COVID-19. • Each index will be examined across different sectors to classify them into four categories based on resilience: resistance and recovery characteristics.

Performance of Stock markets in 2020 – S&P500, STOXX600 and TOPIX

January 1, 2020 = 100
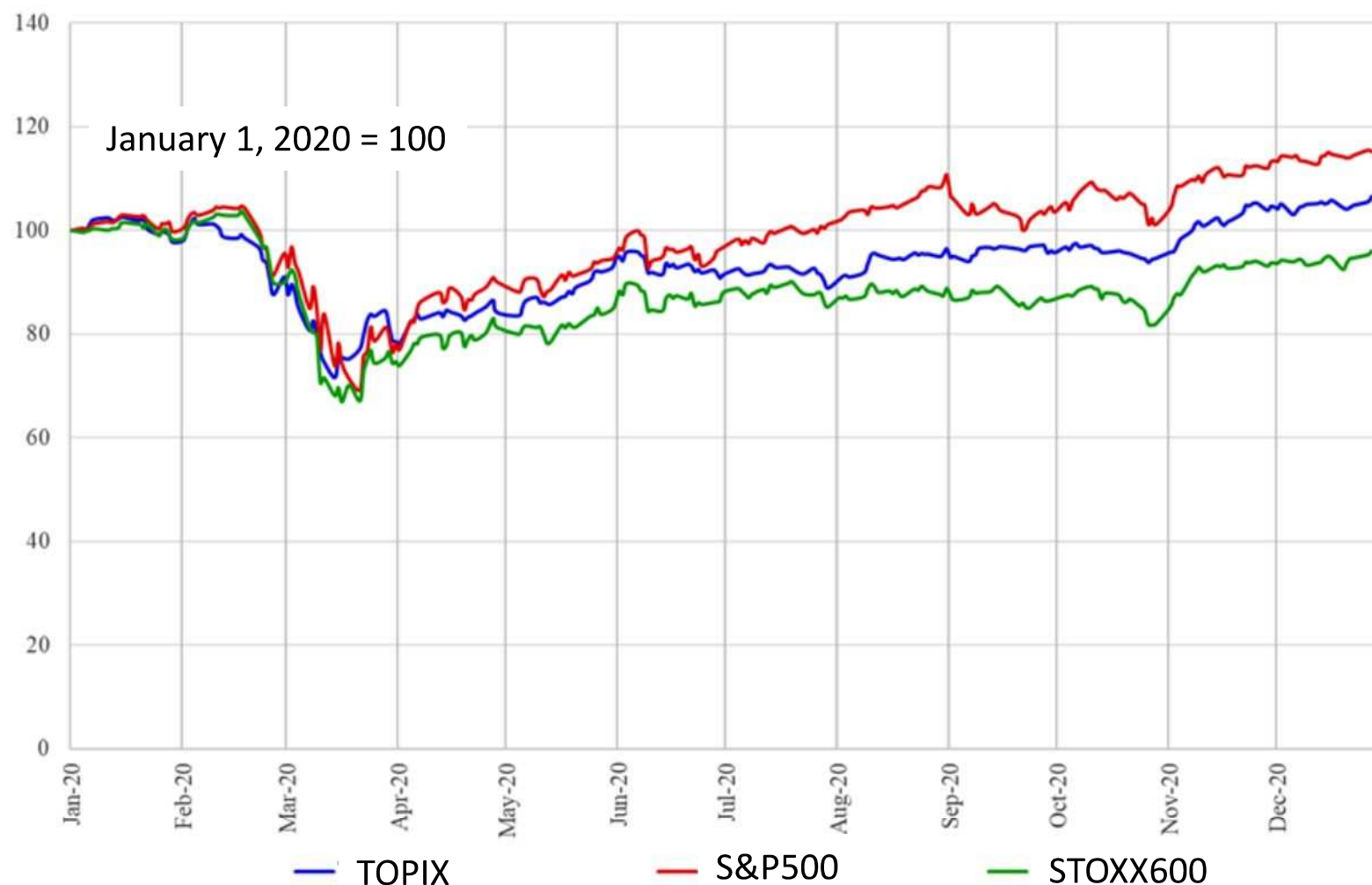
- *In 2020, stock markets had a volatile year.*
- *They experienced a significant decline. and in March they bottomed out and recovery from there.*

Index	Number of Constituent Stocks	Region
S&P500	Approximately 500	United States
STOXX600	Approximately 600	Europe
TOPIX	Approximately 2,100	Japan

— TOPIX   — S&P500   — STOXX600

Performance of Volatility Indices in 2020 – VIX, VSTOXX and NKVI

AFIR-ERM Finance, Investment & ERM

- *The VIX index is a measurement of American market volatility.*
- *The VIX is also known as the "fear index" and used as an indicator of investor sentiment.*
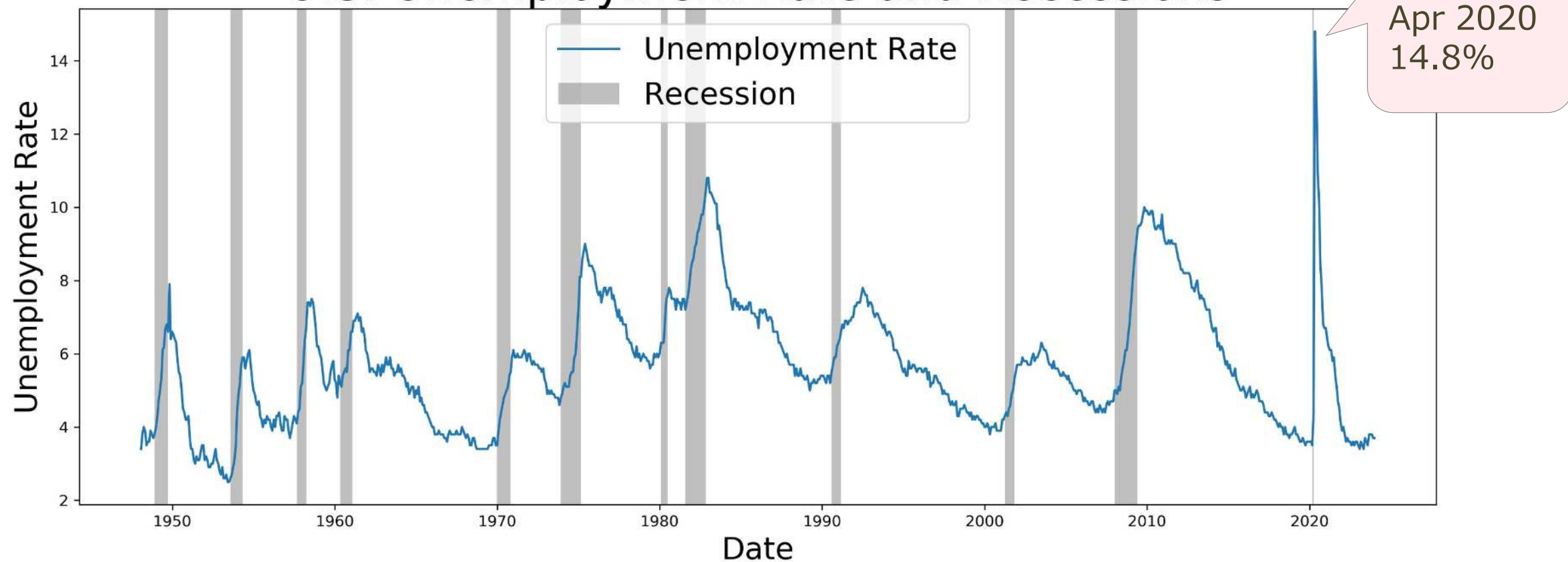- *In 2020 the VIX reached historic highs!*

- *VIX highs*

Event	Date	VIX Value
Lehman Brothers Collapse	September 2008	89.53
European Sovereign Debt Crisis	May 2010	48.20
COVID-19 Pandemic	March 2020	85.47

Business cycle in 2020

U.S. Unemployment Rate and Recessions

Apr 2020 14.8%

Sector Classification – S&P500

11 sectors of S&P500	Representative companies
Energy	Exxon Mobil Corporation (XOM) Chevron Corporation (CVX)
Materials	Ecolab Inc. (ECL) DuPont de Nemours, Inc. (DD)
Industrials	General Electric Company (GE) United Parcel Service, Inc. (UPS)
Consumer Discretionary	Amazon.com, Inc. (AMZN) Nike, Inc. (NKE)
Consumer Staples	The Coca-Cola Company (KO) Procter & Gamble Company (PG)
Health Care	Johnson & Johnson (JNJ) Pfizer Inc. (PFE)
Financials	JPMorgan Chase & Co. (JPM) Bank of America Corporation (BAC)
Information Technology	Apple Inc. (AAPL) Microsoft Corporation (MSFT)
Communication Services	Alphabet Inc. (GOOGL) Meta Platforms, Inc. (META)
Utilities	NextEra Energy, Inc. (NEE)
Real Estate	Simon Property Group, Inc. (SPG)

- *The Global Industry Classification Standard (GICS) is a widely used system for categorizing companies into different industry sectors within the American stock market.*
- *Companies are classified into 11 sectors.*

Performance of each sector in S&P500 in 2020.
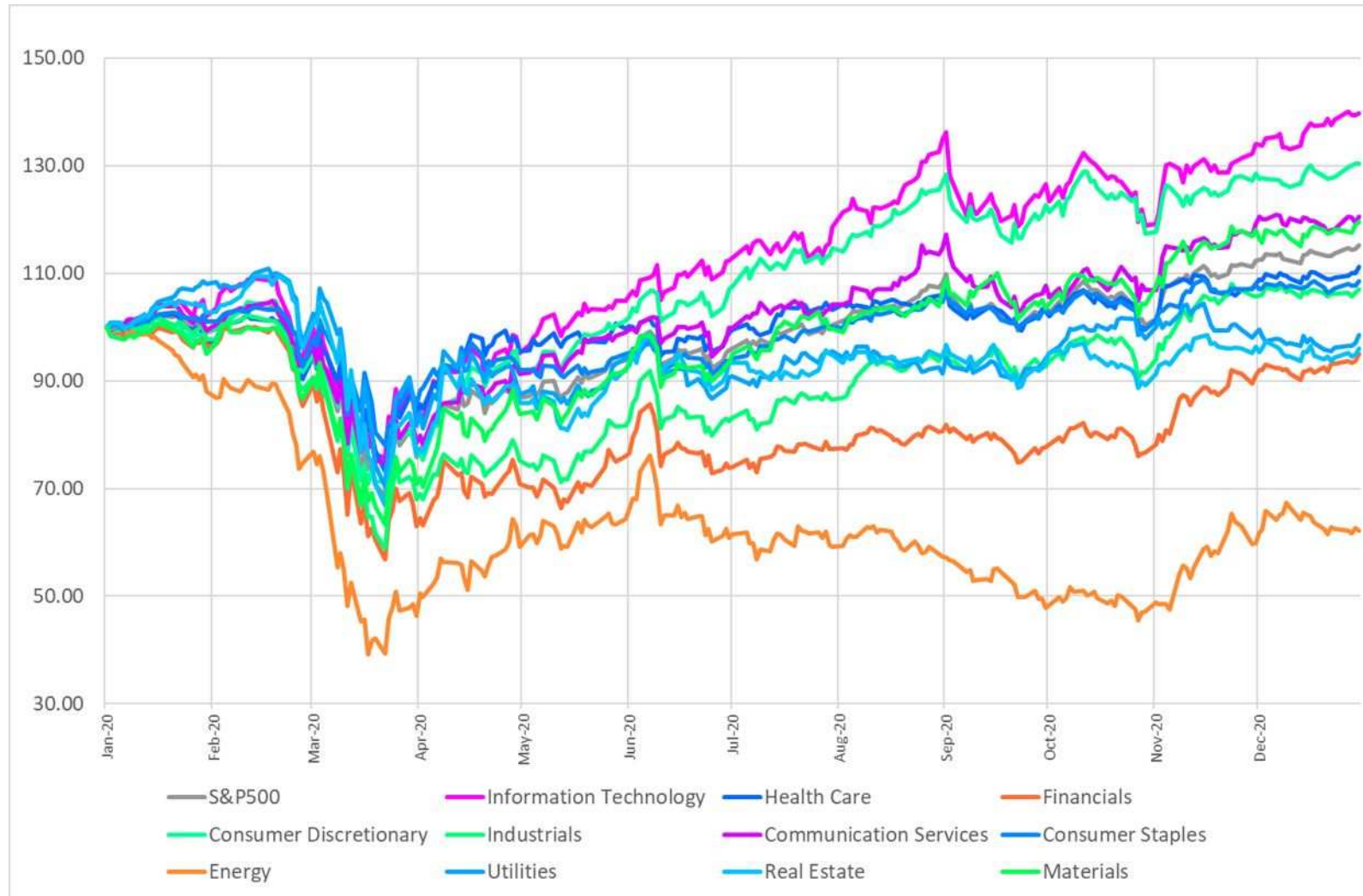
The Information Technology sector is the best performance due to the high demand.

The Energy sector is the worst performance due to decline in oil prices.

# Sector Classification – STOXX600 and TOPIX

20 sectors of STOXX600	
Health Care	Financial Services
Industrial Goods & Services	Constriction & Materials
Banks	Telecommunications
Food Beverage and Tobacco	Basic Resources
Technology	Personal Care Drug and Grocery Stores
Consumer Products and Services	Automobiles & Parts
Energy	Real Estate
Insurance	Media
Utilities	Travel & Leisure
Chemicals	Retail

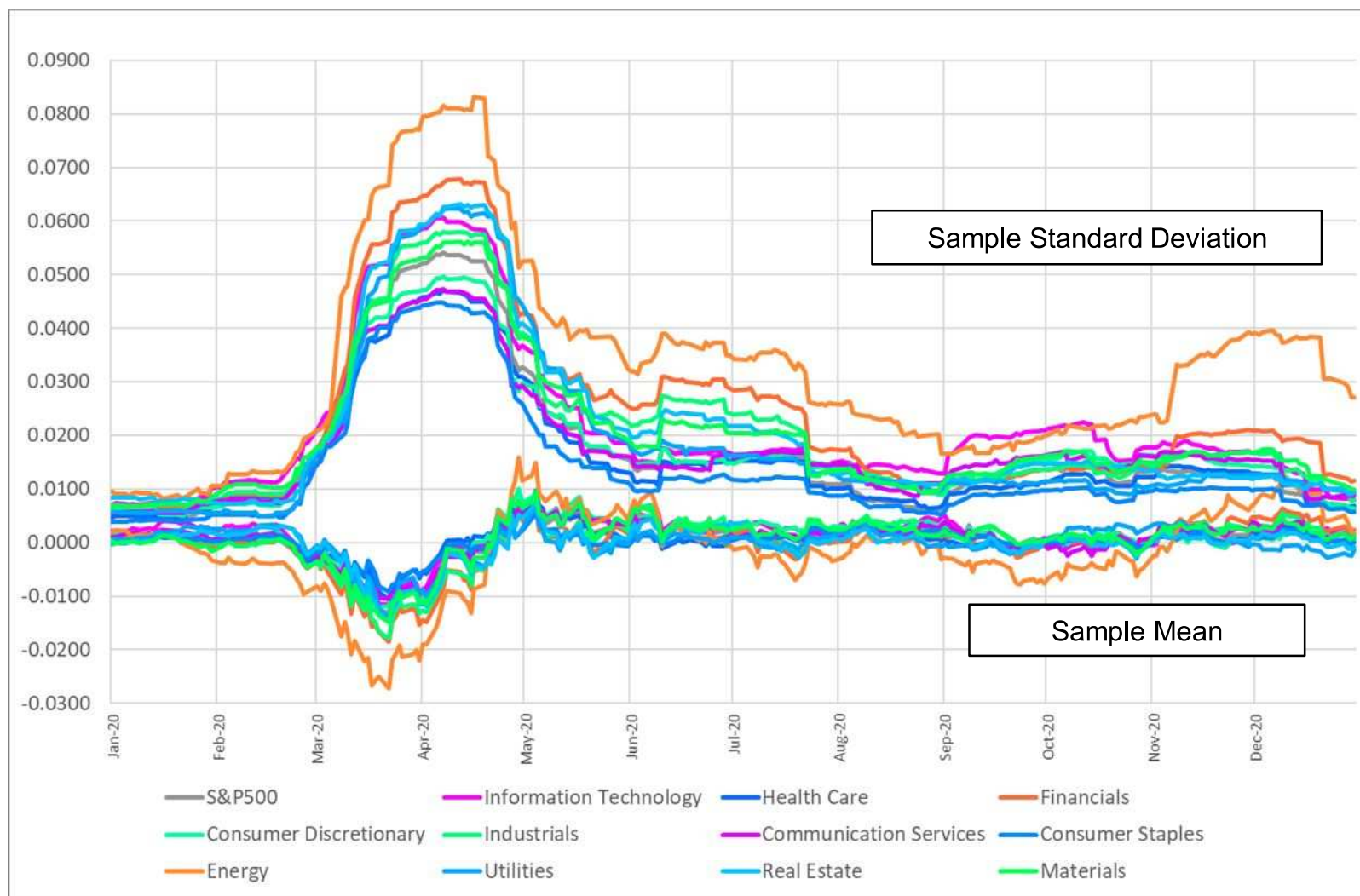| 33 sectors of TOPIX	
Electronics Appliances	Glass & Ceramics Products
Other Products	Metal Products
Precision Instruments	Nonferrous Metals
Information & Communication	Transportation Equipment
Chemicals	Construction
Machinery	Banks
Service	Fishery, Agriculture & Forestry
Retail Trade	Rubber Products
Electric Power & Gas	Textiles & Apparels
Foods	Real Estate
Pharmaceutical	Land Transportation
Pulp & Paper	Oil & Coal Products
Other Financing Business	Iron & Steel
Securities & Commodity Futures	Mining
Wholesale Trade	Air Transportation
Warehousing & Harbour Transportation Services	Marine Transportation
Insurance	

Performance of each sector in STOXX600 in 2020.
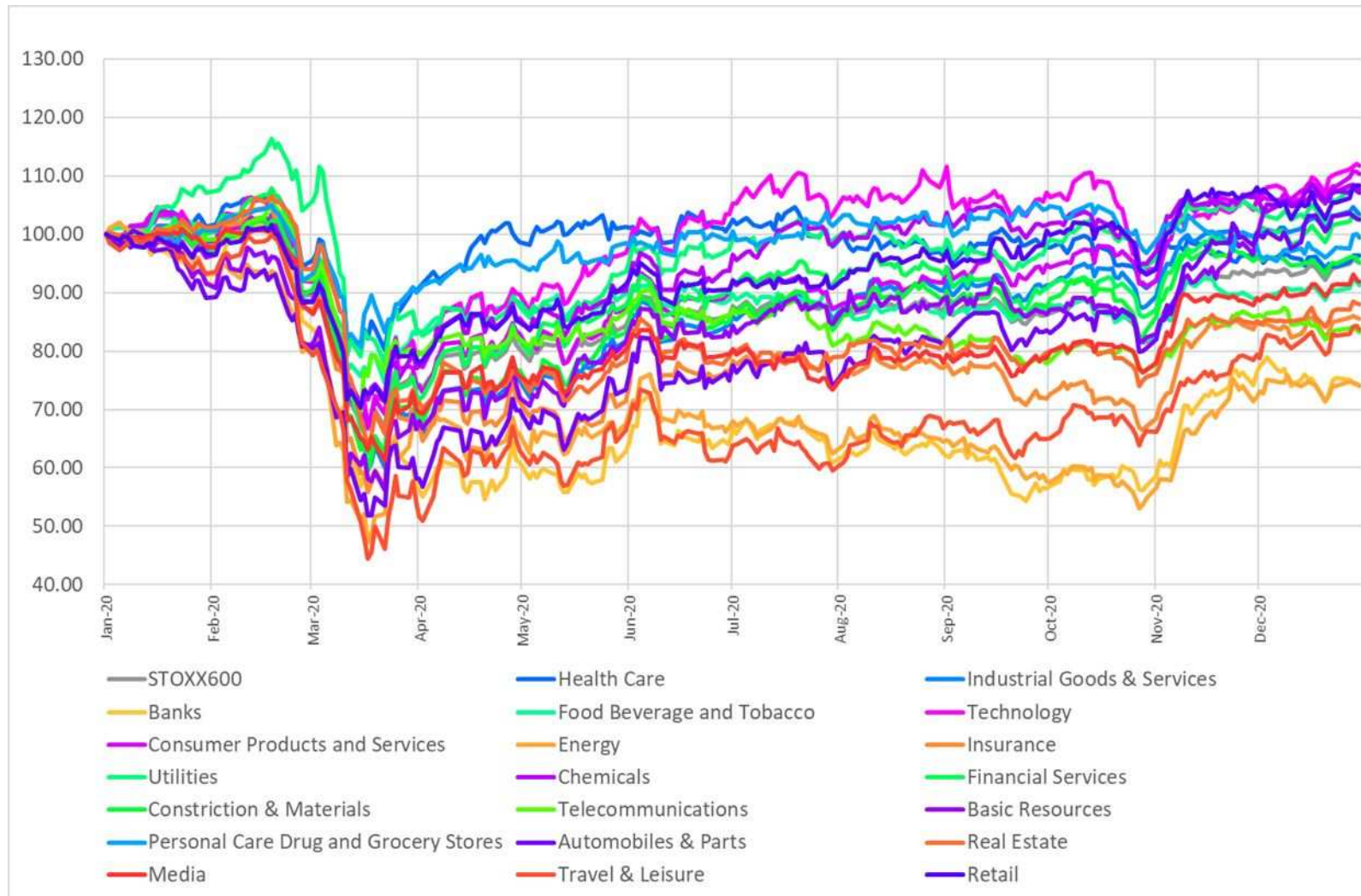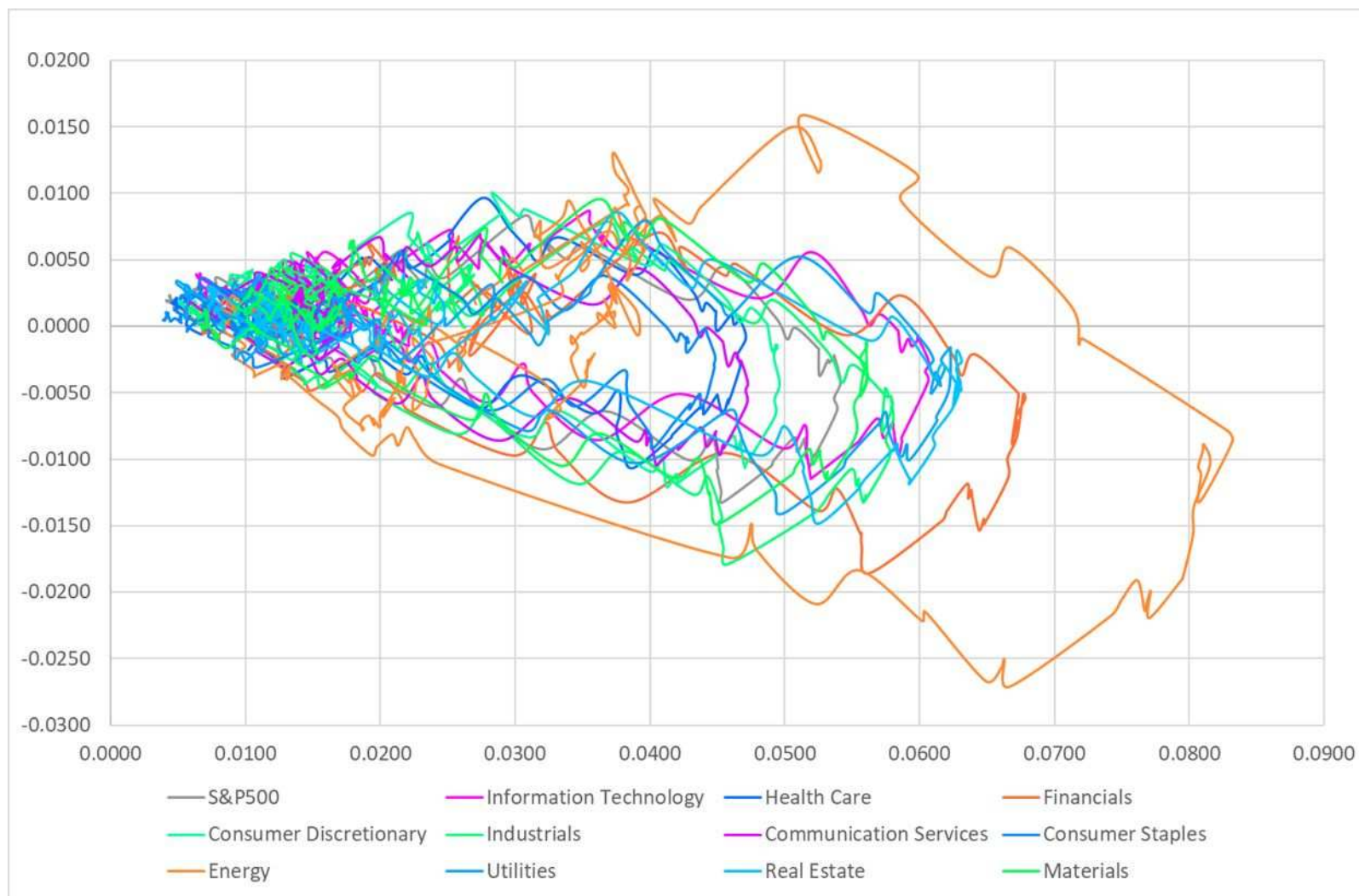
Performance of each sector in TOPIX in 2020.
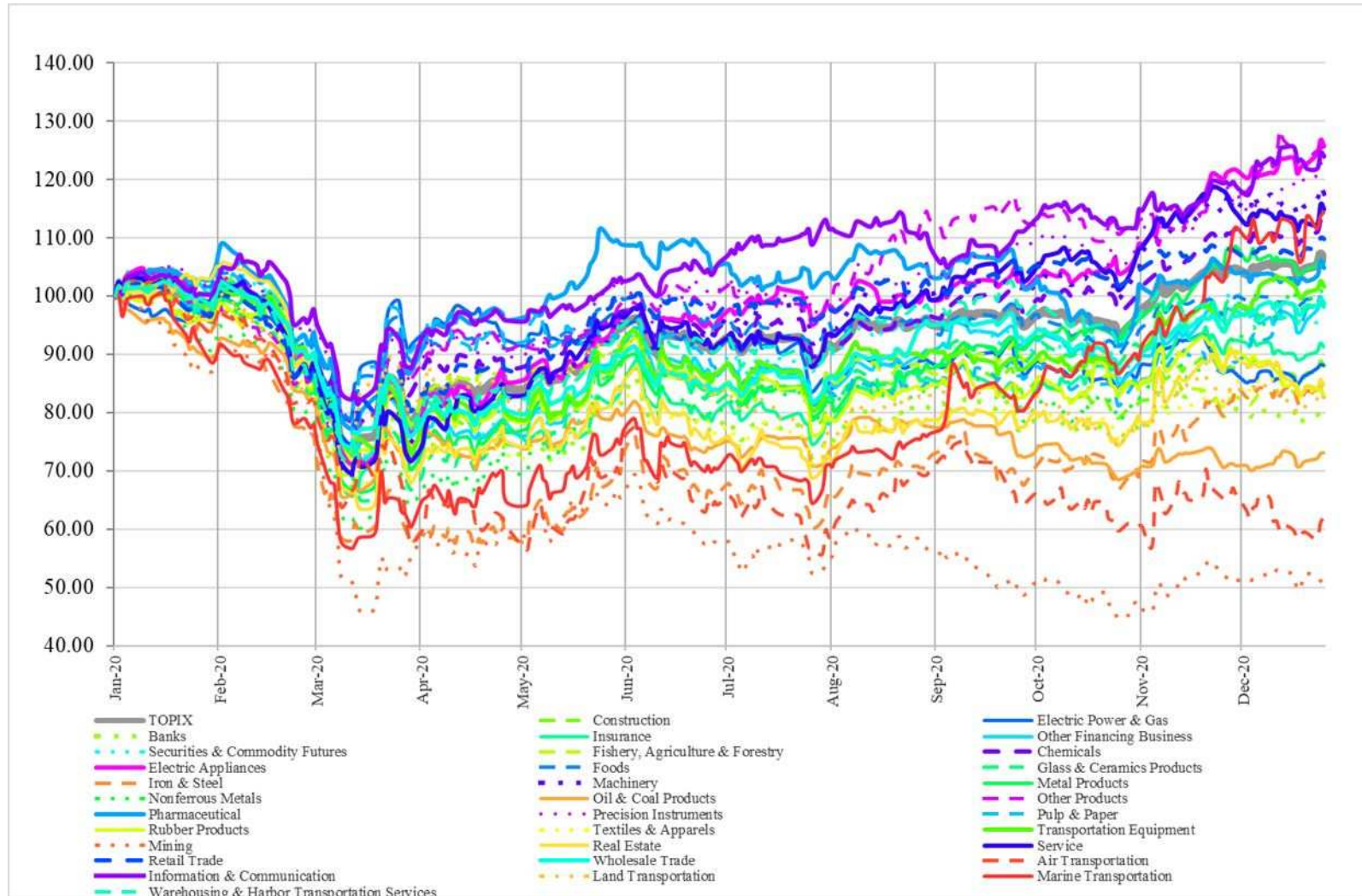
Risk-Return of 11 Sector Indices - S&P500
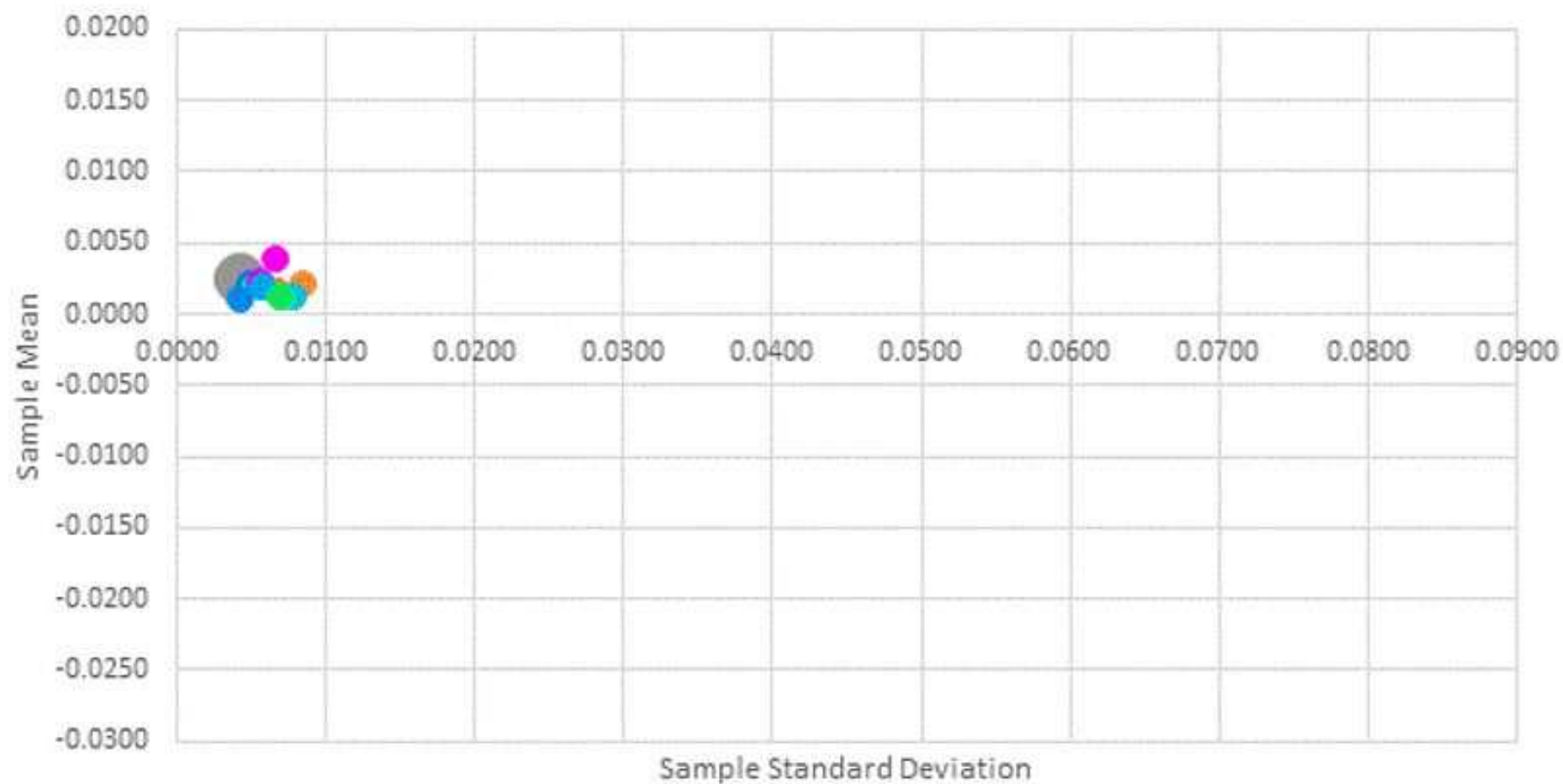
Risk-return Orbit of Sector Indices - S&P500

16 January 2020

Correlation Coefficients with S&P500
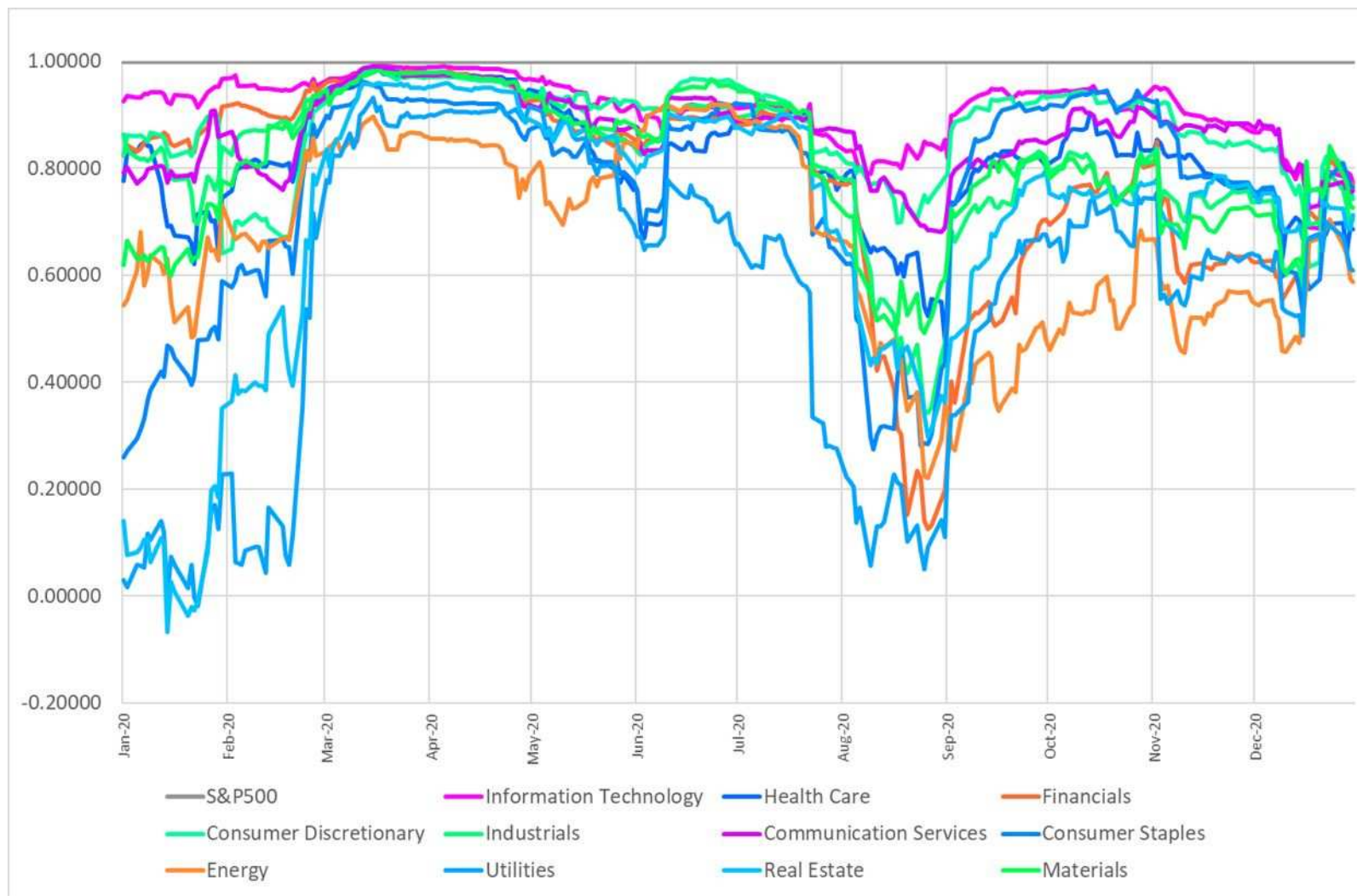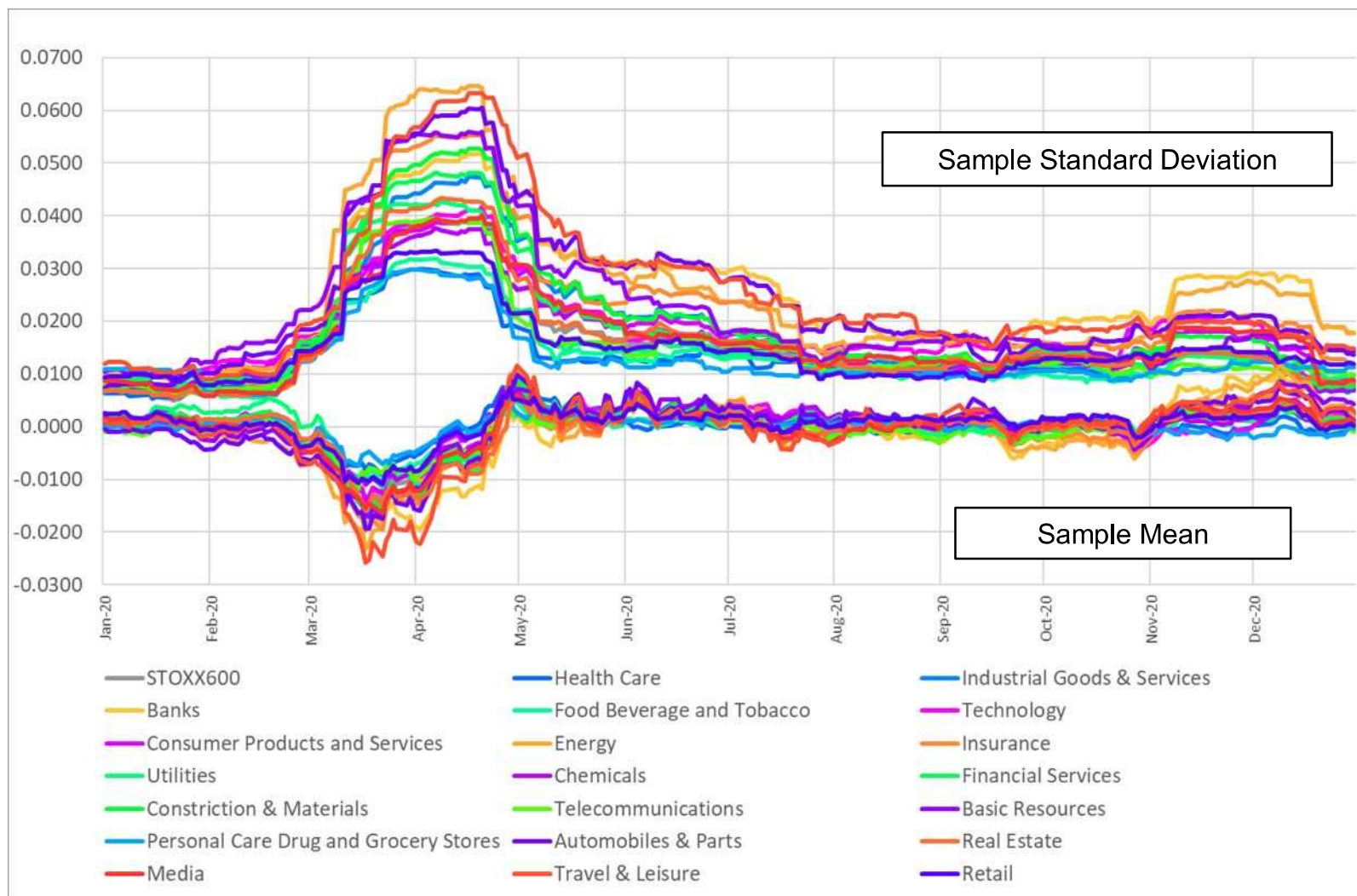
Risk-Return of 20 Sector Indices – STOXX600
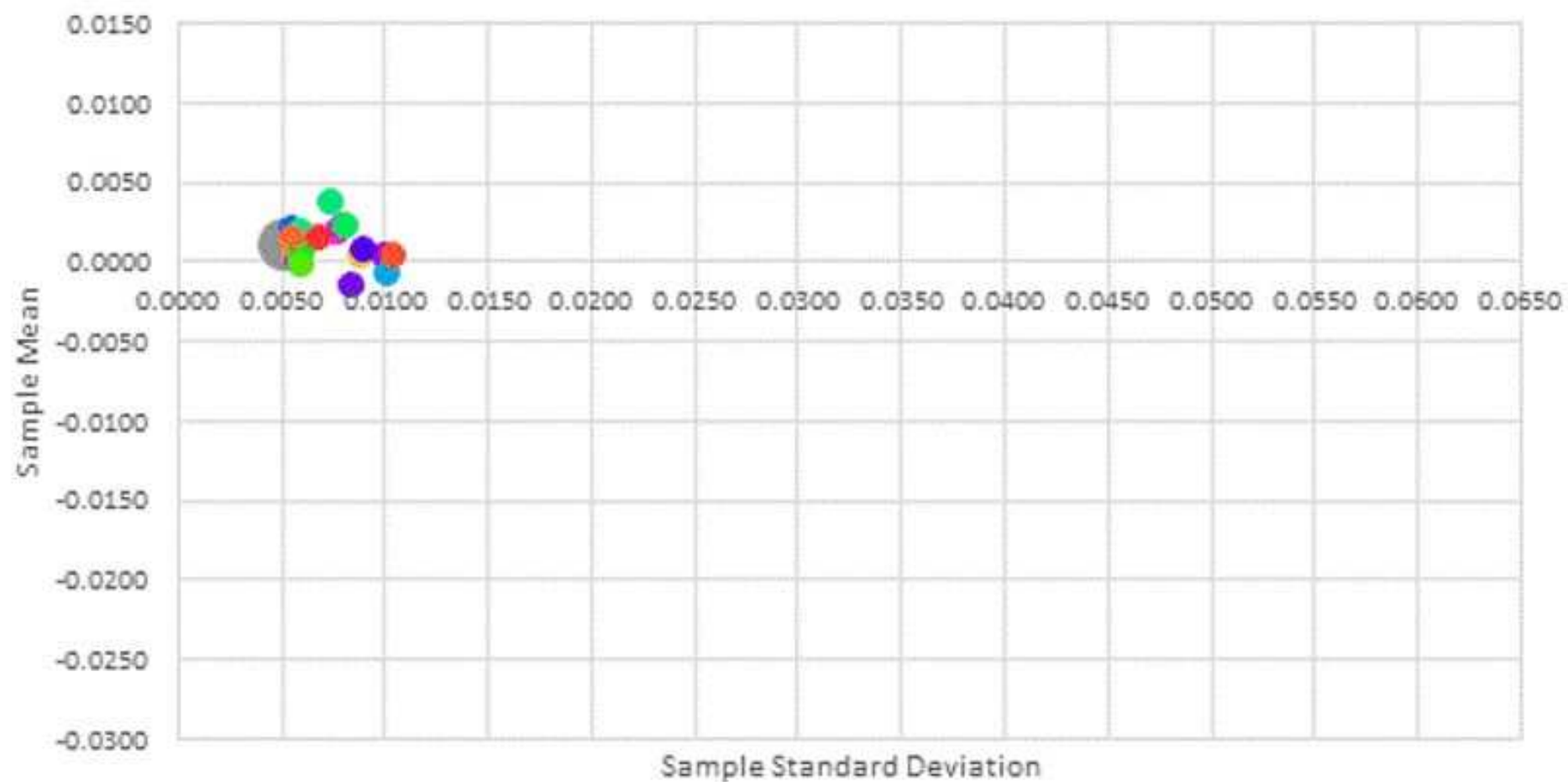

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Risk-return Orbit of Sector Indices – STOXX600
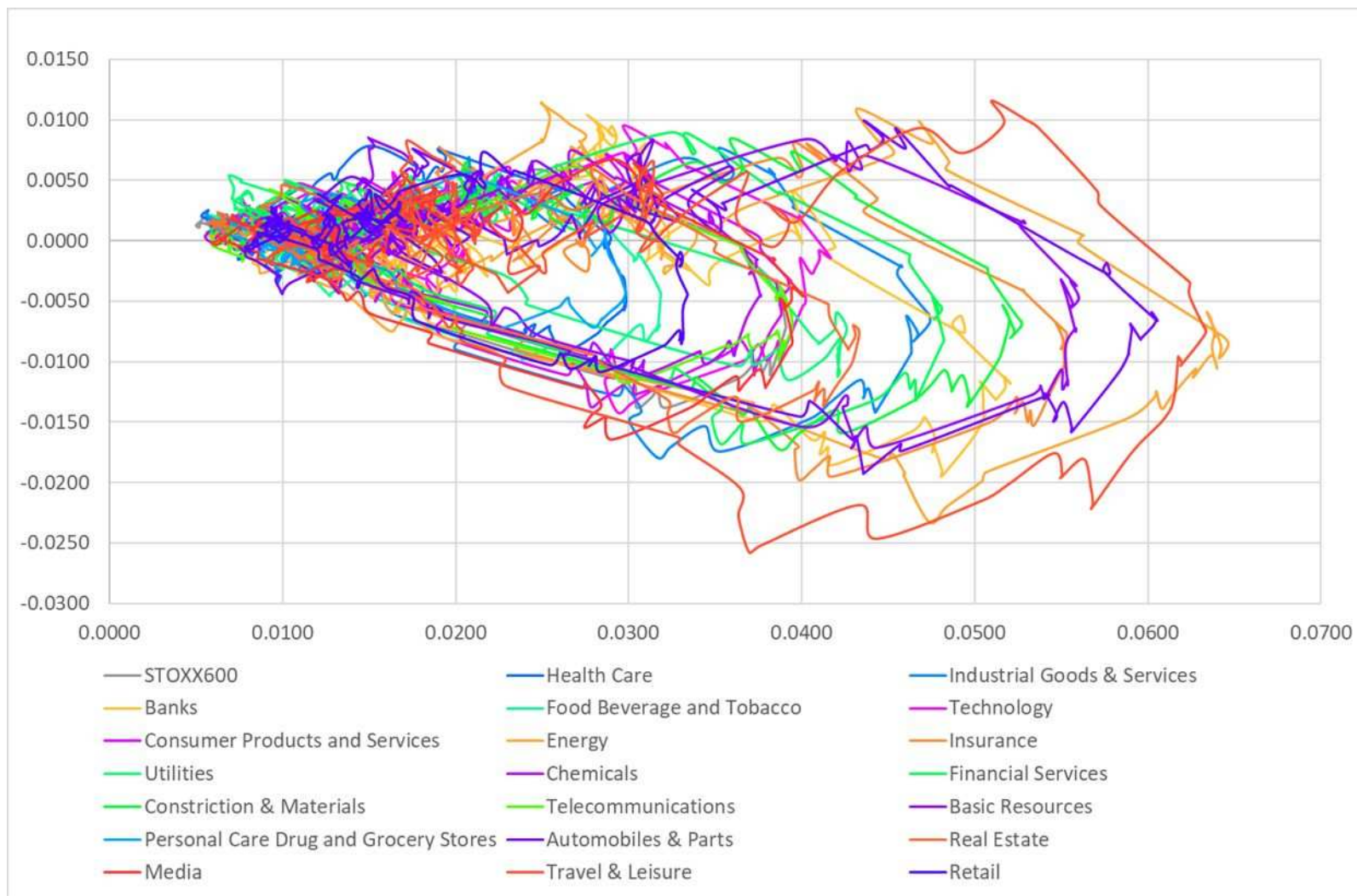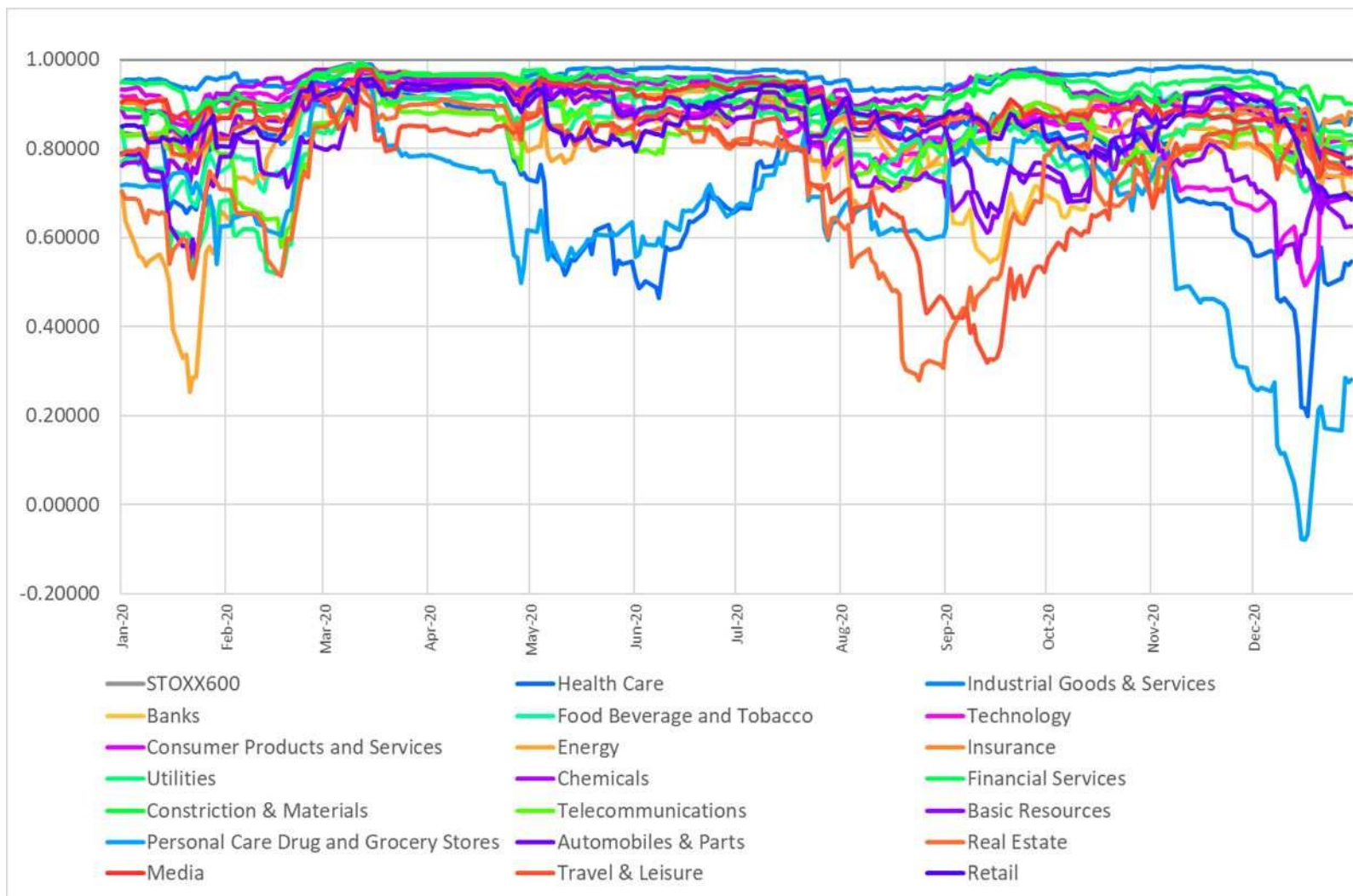
23 January 2020

Legend:
- STOXX600
- Technology
- Consumer Products and Services
- Chemicals
- Basic Resources
- Automobiles & Parts
- Retail
- Health Care
- Industrial Goods & Services
- Personal Care Drug and Grocery Stores
- Food Beverage and Tobacco
- Utilities
- Financial Services
- Constriction & Materials
- Telecommunications
- Banks
- Energy
- Insurance
- Real Estate
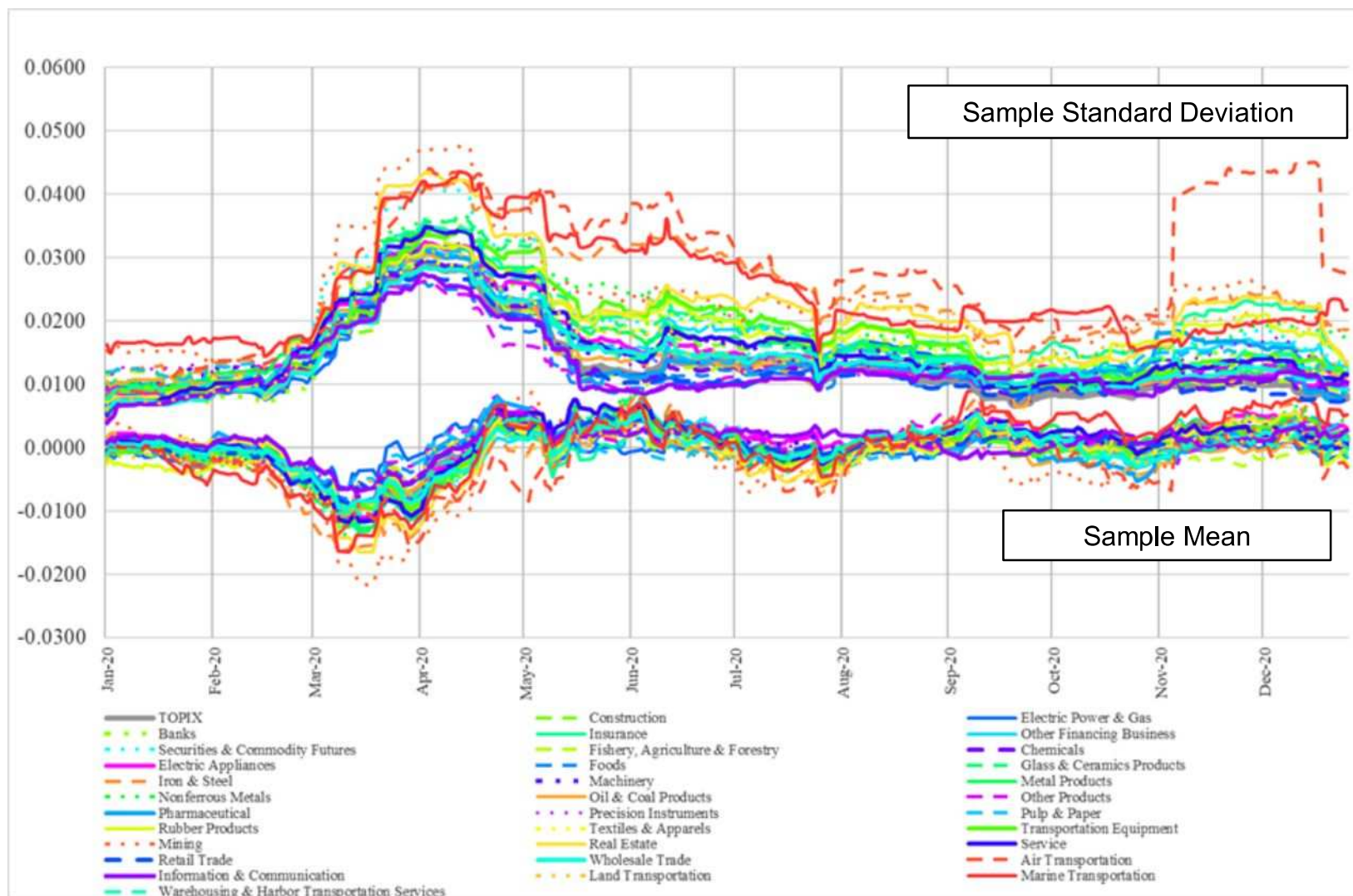- Travel & Leisure
- Media

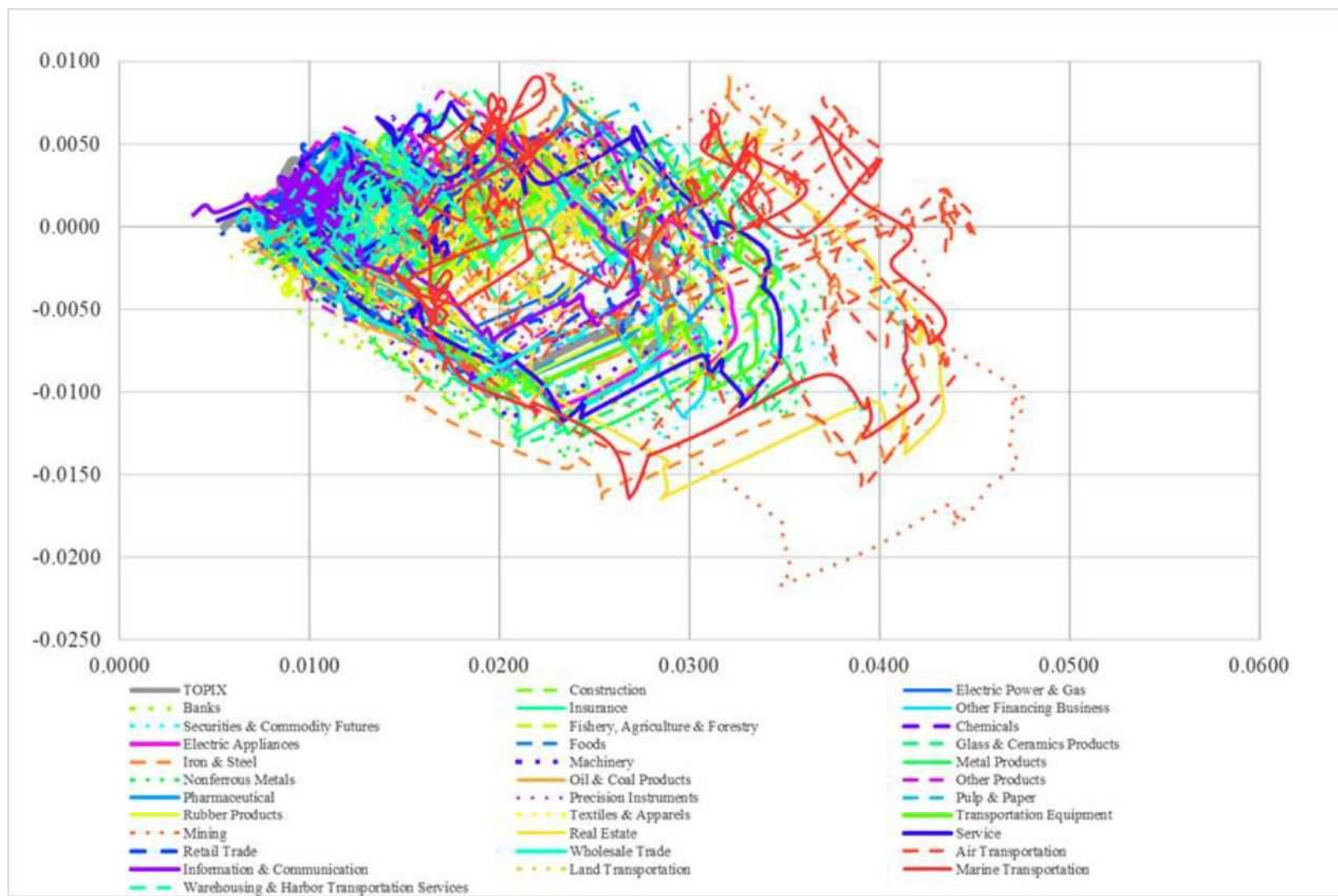# Correlation Coefficients with STOXX600
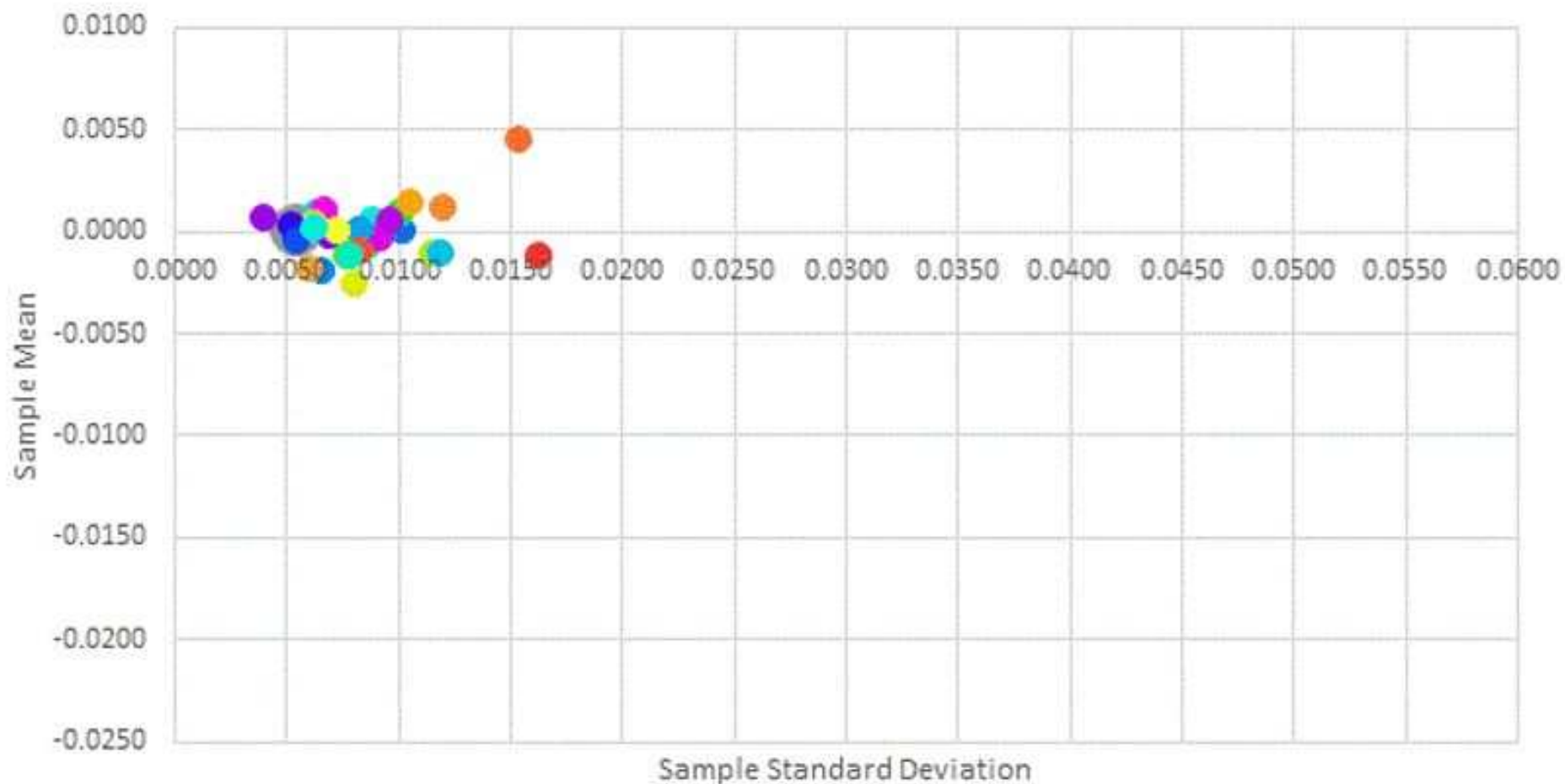
Risk-Return of 33 Sector Indices - TOPIX

Risk-return Orbit of Sector Indices - TOPIX

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06 January 2020

Correlation Coefficients with TOPIX

Categorisation

- According to the methodology, we categorised the sectors into four groups from the view of resilience.

Group	Resistance	Recovery
A	Excellent or Good	Excellent
B	Excellent or Good	Good or Average
C	Average	Good or Average
D	Poor	Poor

Categorisation - S&P500

- We shall evaluate **the resistance** by the decline in value at the onset of the pandemic, **the recovery** by the average return during the recovery process, and **the ability to adapt to change** by its risk-return efficiency, respectively.

- The figure shows the index on 18 Mar 2020 (horizontal axis) and the average return from 18 Mar 2020 to 30 Dec 2020 (vertical axis), indicating the degree of resistance and growth.

Vertical axis: *Average Return from 18 Mar 2020 to 30 Dec 2020*
Horizontal axis: *Sector Indices on 18 Mar 2020*

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Categorisation - S&P500

- The figure shows the standard deviation (horizontal axis) and the average return (vertical axis) during the period, indicating the steadiness of growth.

- Using those figures, we categorise sectors by the index on 18 Mar 2020 and the average return from 18 Mar 2020 to 30 Dec 2020 and adjust it such that sectors indicating similar risk-return characteristics are in the same group.

Vertical axis: Average Return from 18 Mar 2020 to 30 Dec 2020
Horizontal axis: Standard Deviation during the Period

Categorisation – STOXX600

- The figure shows the index on 18 Mar 2020 (horizontal axis) and the average return from 18 Mar 2020 to 30 Dec 2020 (vertical axis), indicating the degree of resistance and growth.
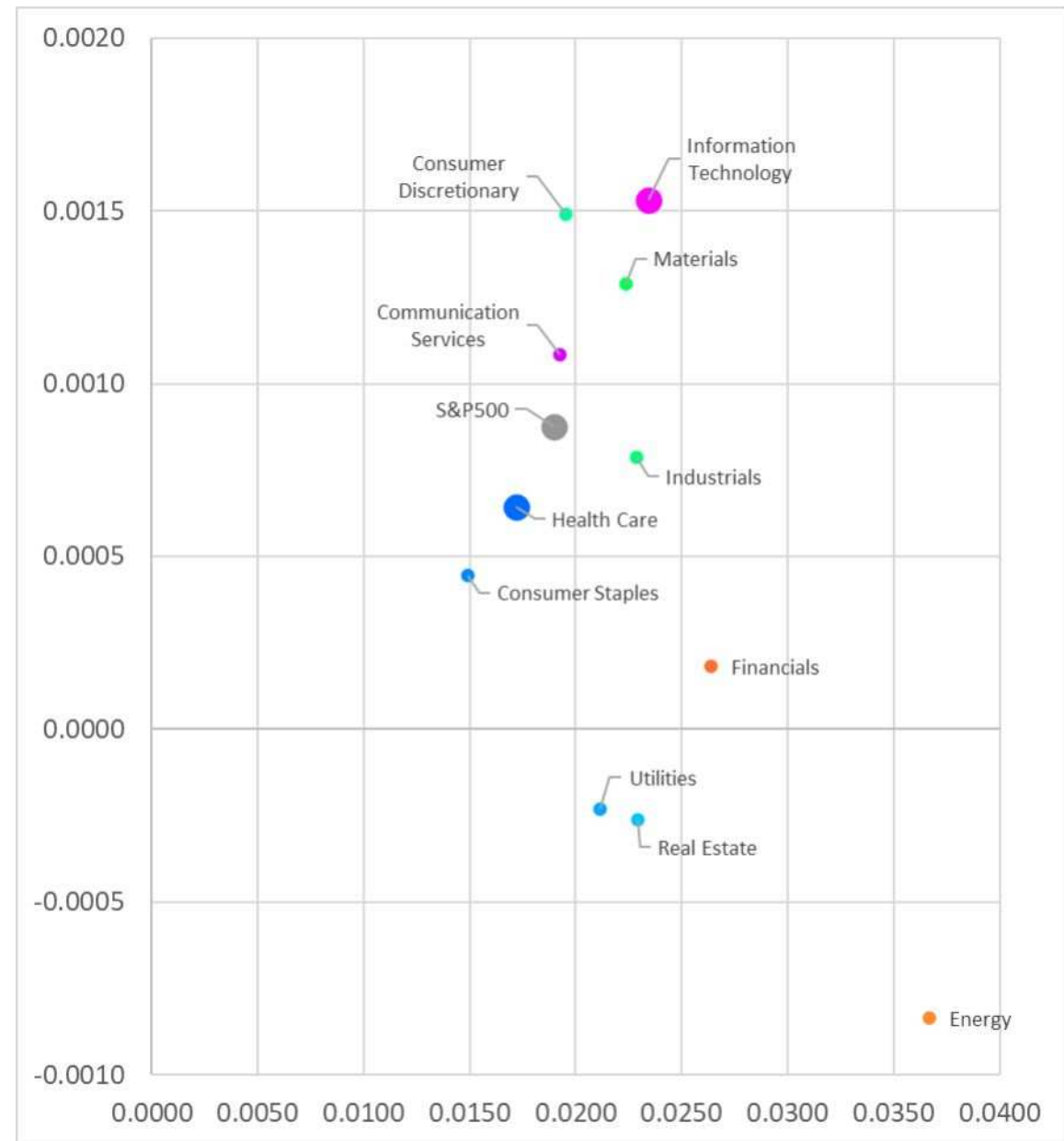

Vertical axis: Average Return from 18 Mar 2020 to 30 Dec 2020
Horizontal axis: Sector Indices on 18 Mar 2020

Categorisation – STOXX600

- The figure shows the standard deviation (horizontal axis) and the average return (vertical axis) during the period, indicating the steadiness of growth.

- Using those figures, we categorise sectors by the index on 18 Mar 2020 and the average return from 18 Mar 2020 to 30 Dec 2020 and adjust it such that sectors indicating similar risk-return characteristics are in the same group.
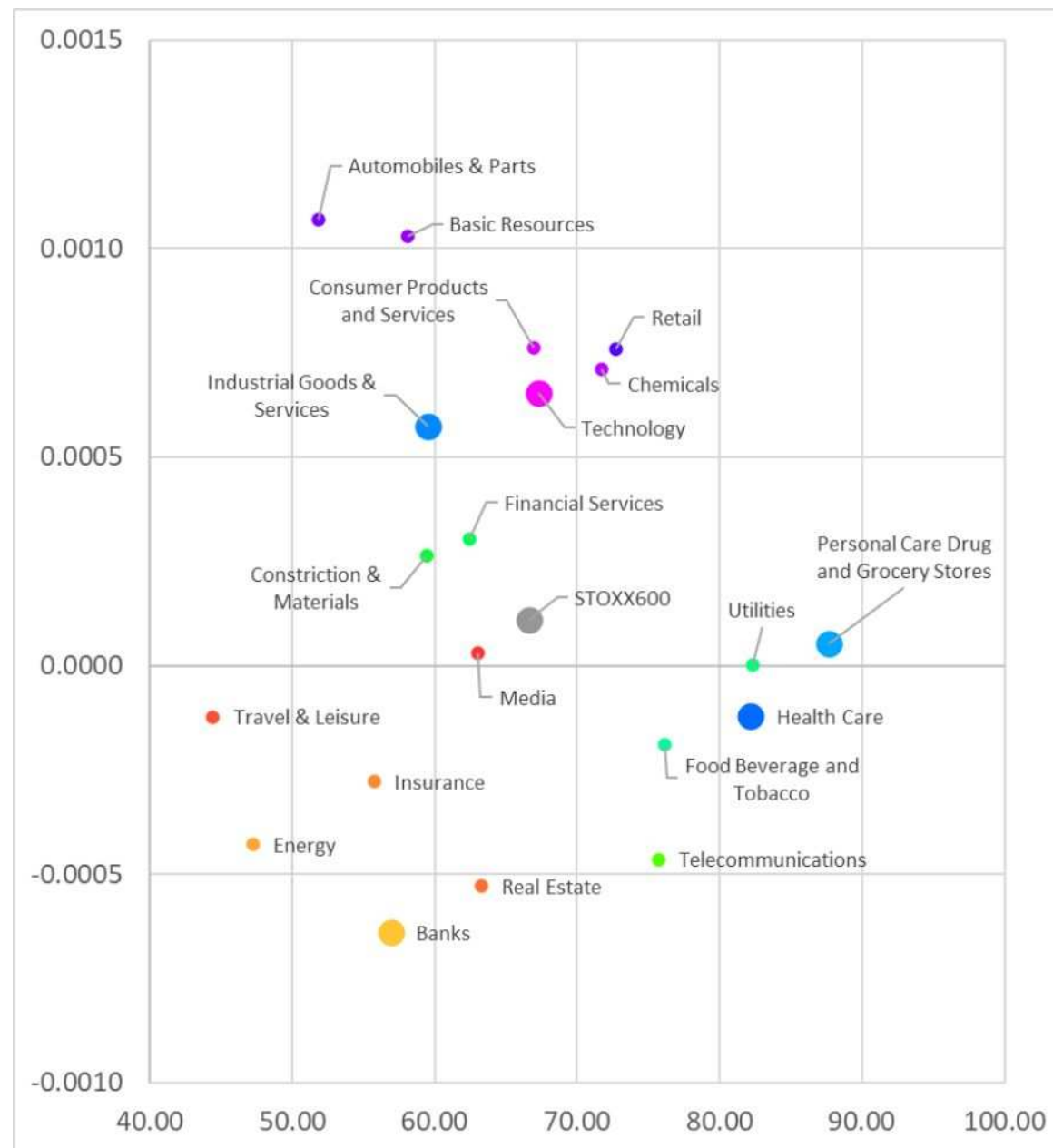

Vertical axis: *Average Return from 18 Mar 2020 to 30 Dec 2020*
Horizontal axis: *Standard Deviation during the Period*

Categorisation - TOPIX

- The figure shows the index on 16 Mar 2020 (horizontal axis) and the average return from 16 Mar 2020 to 30 Dec 2020 (vertical axis), indicating the degree of resistance and growth.
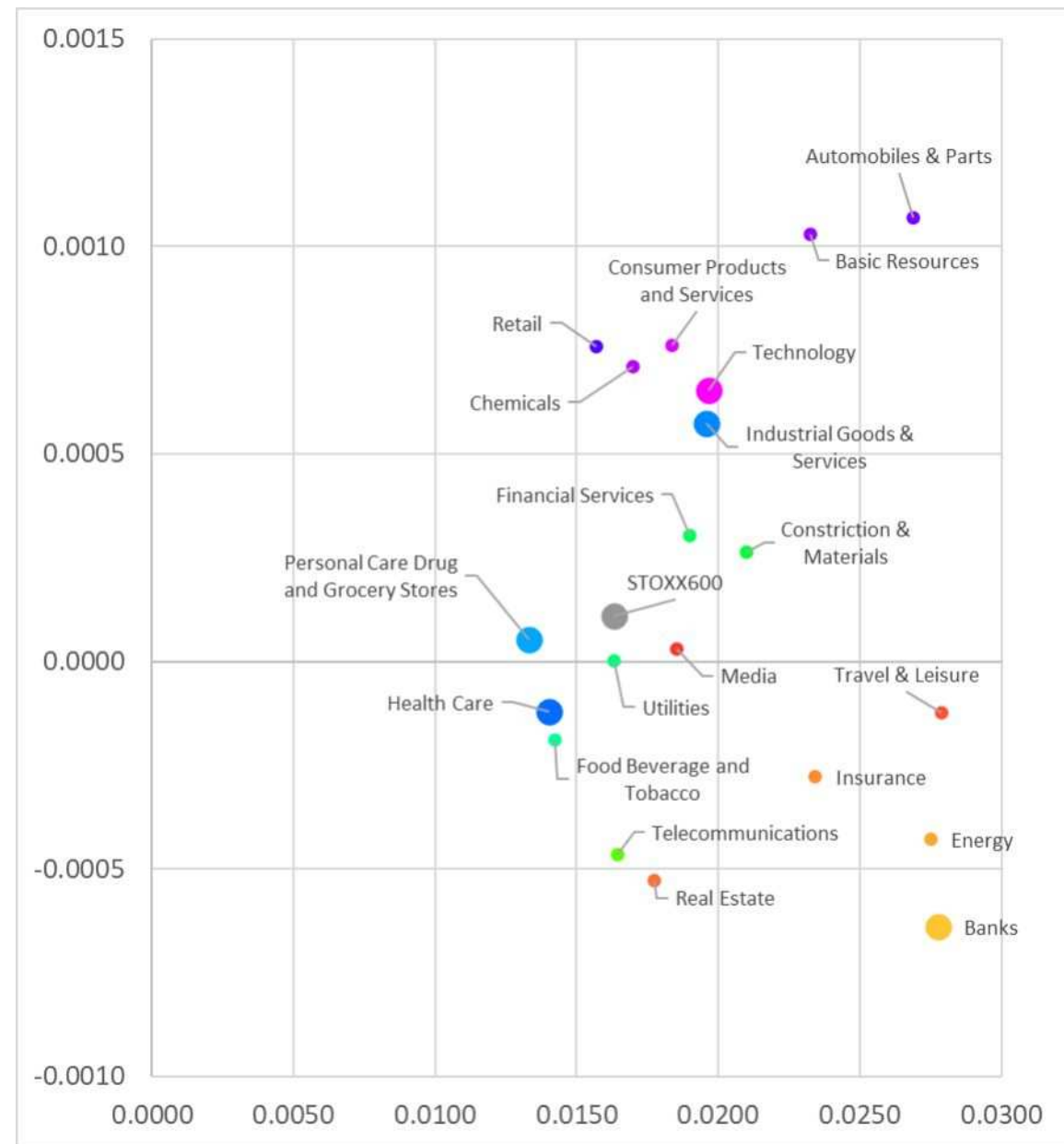

Vertical axis: Average Return from 16 Mar 2020 to 30 Dec 2020
Horizontal axis: Sector Indices on 16 Mar 2020

Categorisation - TOPIX

- The figure shows the standard deviation (horizontal axis) and the average return (vertical axis) during the period, indicating the steadiness of growth.

- Using those figures, we categorise sectors by the index on 16 Mar 2020 and the average return from 16 Mar 2020 to 30 Dec 2020 and adjust it such that sectors indicating similar risk-return characteristics are in the same group.

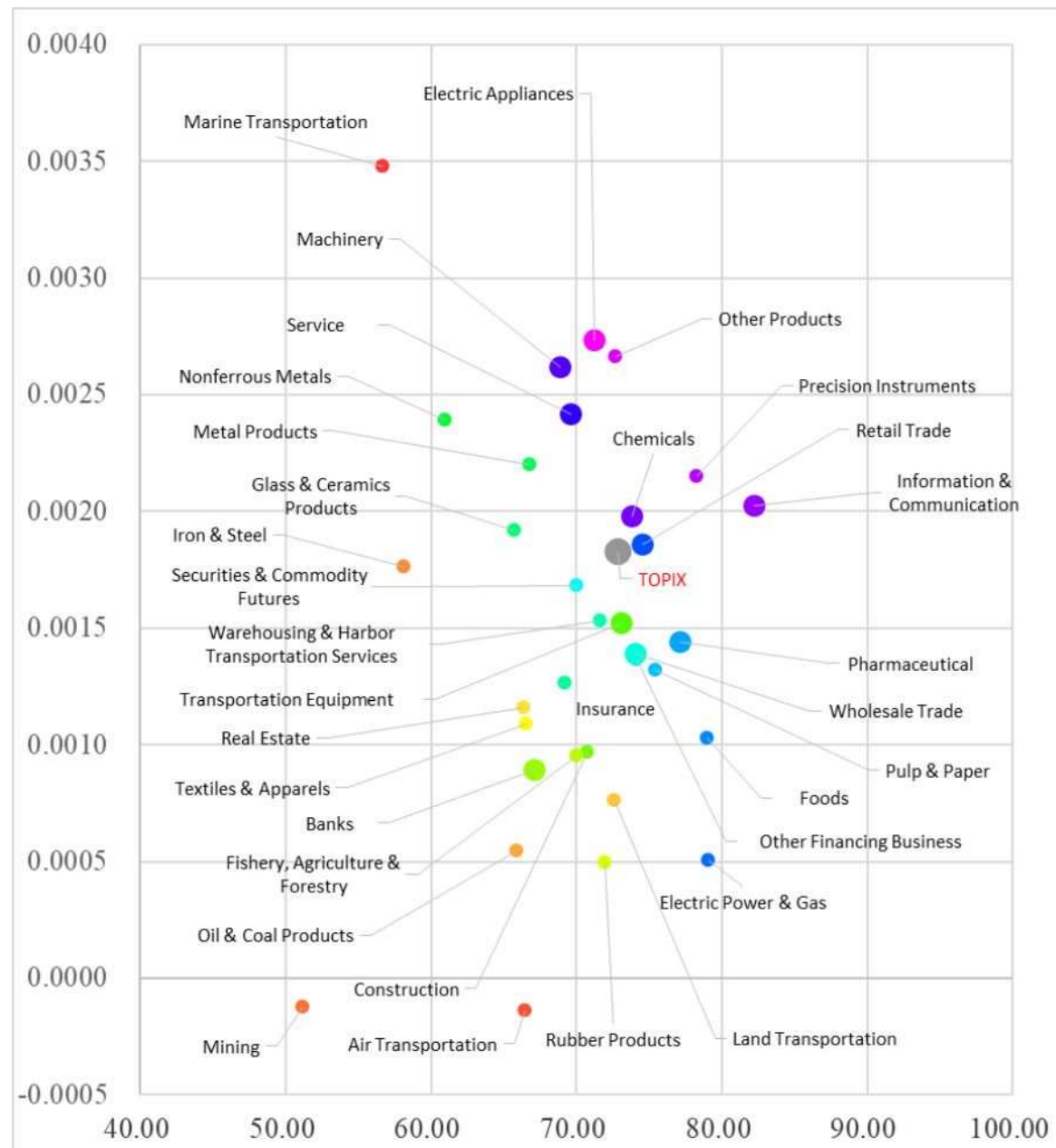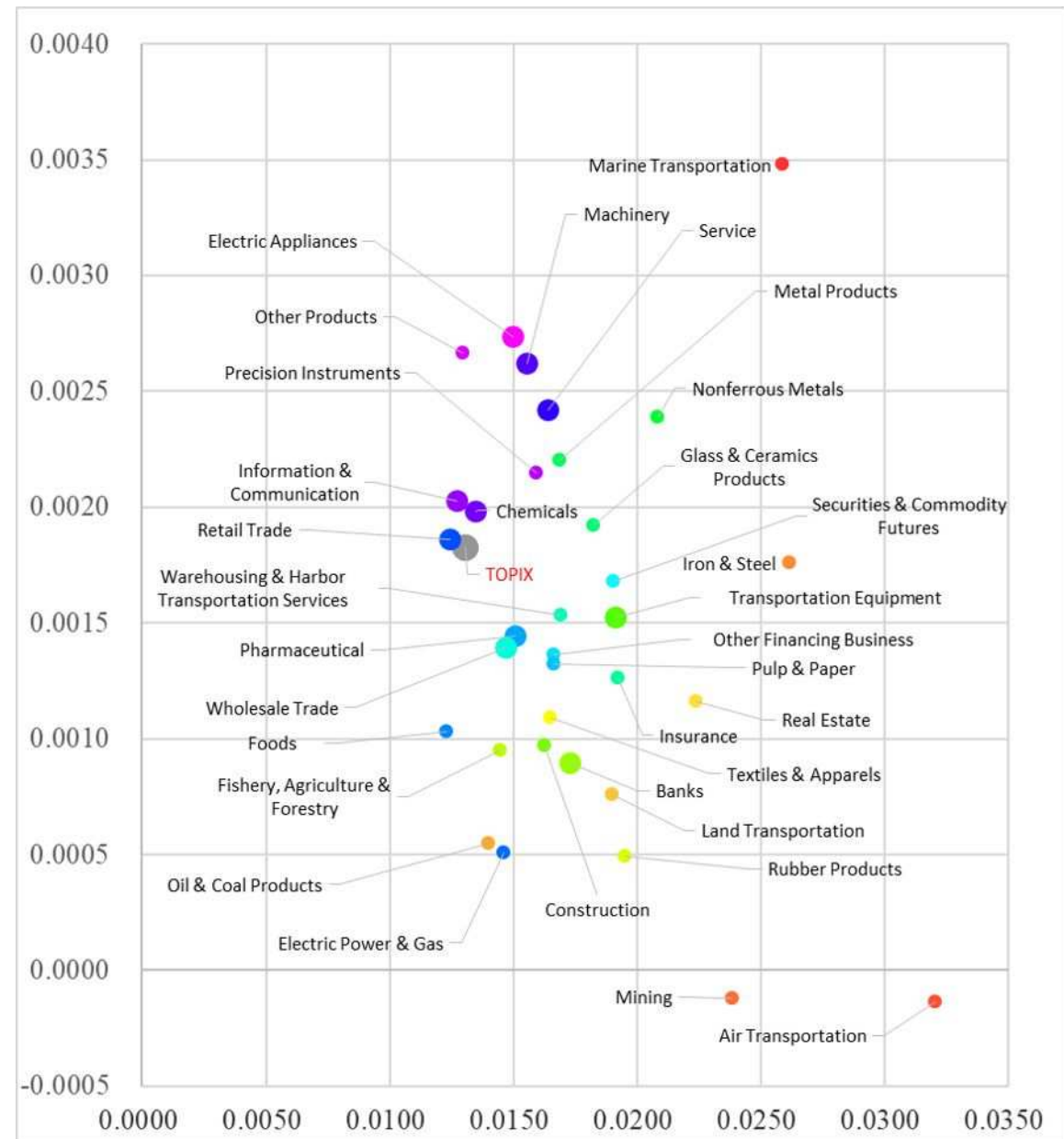*Vertical axis: Average Return from 16 Mar 2020 to 30 Dec 2020*
Horizontal axis: Standard Deviation during the Period

Categorisation – S&P500

Group	Resistance	Recovery
A	Excellent or Good	Excellent
B	Excellent or Good	Good or Average
C	Average	Good or Average
D	Poor	Poor

	Sector	Characteristic
A	Information Technology, Consumer Services	Group A consists of sectors that adapt their businesses, grow due to increased demand, and lead the overall market recovery.
B	Health Care, Consumer Staples, Utilities, Real Estate	Group B had strong resilience against the pandemic but did not benefit significantly from the pandemic, and the recovery was not very pronounced.
C	Consumer Discretionary, Industrials, Materials	Group C was vulnerable during the pandemic and had little associated benefits, resulting in a slower recovery compared to the overall market. The recovery of this group depends on the overall market.
D	Financials, Energy	Group D is the most affected group by the pandemic, with a high dependency on infection prevention measures and oil prices, hindering its recovery.

Categorisation – STOXX600 and TOPIX

Group	Resistance	Recovery
A	Excellent or Good	Excellent
B	Excellent or Good	Good or Average
C	Average	Good or Average
D	Poor	Poor

	Sector
A	Technology, Consumer Products and Services, Chemicals, Basic Resources, Automobiles & Parts, Retail
B	Health Care, Industrial Goods & Services, Personal Care Drug and Grocery Stores
C	Food Beverage and Tobacco, Utilities, Financial Services, Constriction & Materials, Telecommunications
D	Banks, Energy, Insurance, Real Estate, Travel & Leisure, Media

	Sector
A	Electronics Appliances, Information & Communication, Chemicals, Machinery, Service, Precision Instruments, Other Products, Retail Trade
B	Electric Power & Gas, Foods, Pharmaceutical, Pulp & Paper, Other Financing Business, Securities & Commodity Futures, Wholesale Trade, Warehousing & Harbour Transportation Services
C	Insurance, Glass & Ceramics Products, Metal Products, Nonferrous Metals, Transportation Equipment, Construction, Banks, Fishery Agriculture & Forestry, Rubber Products, Textiles & Apparels, Real Estate, Land Transportation
D	Iron & Steel, Oil & Coal Products, Mining, Air Transportation, Marine Transportation

Conclusion

By examining the market behaviour during the crisis, we saw many industries react passively to the crisis and delay their recovery. On the other hand, we saw some industries adapted to the new circumstances were successful and grew remarkably in the period. It provides valuable insight for informing insurers' actions in the next pandemic.

We conclude that looking back and examining what happened during the crisis is essential to prepare for the next crisis, and lessons learned must be leveraged in the next pandemic.

Thank you for your attention!

The paper by Naoki Sunamoto, on which this paper is based, can be downloaded from the following link.