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The Impact of COVID-19 on the Chinese Stock Market: Sentimental or Substantial?

● **Keywords:** COVID-19; Event study; Investor sentiment; Stock returns

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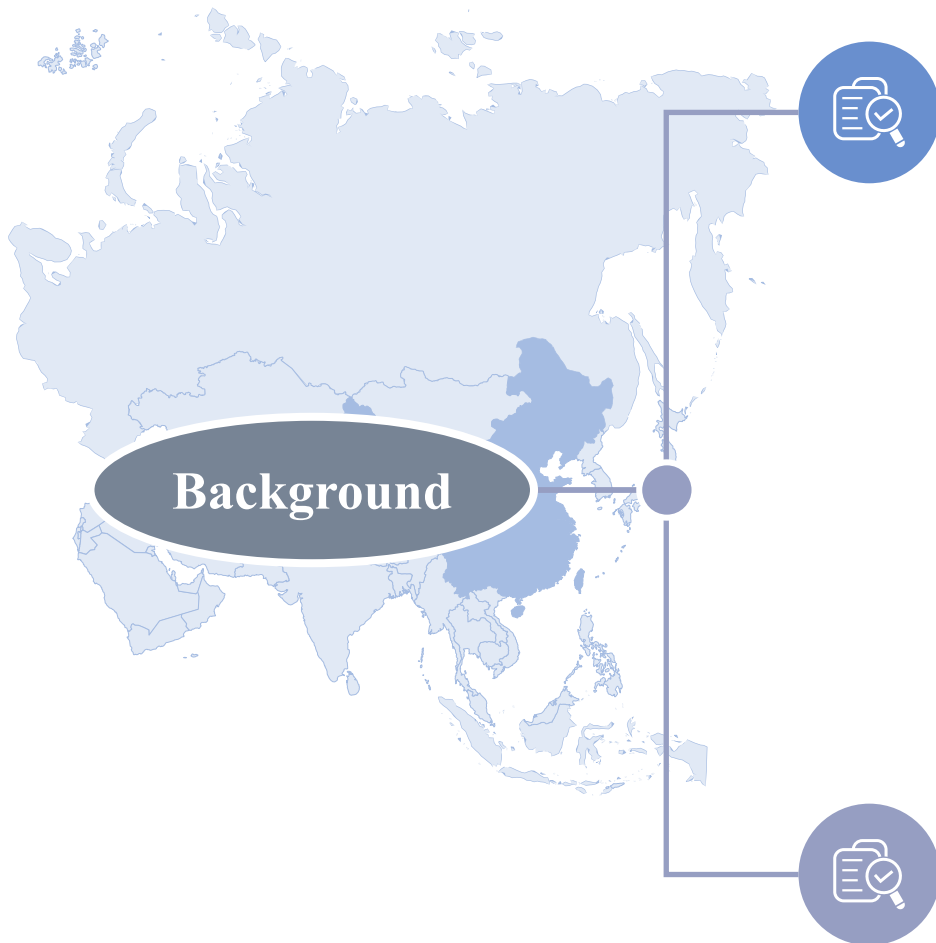
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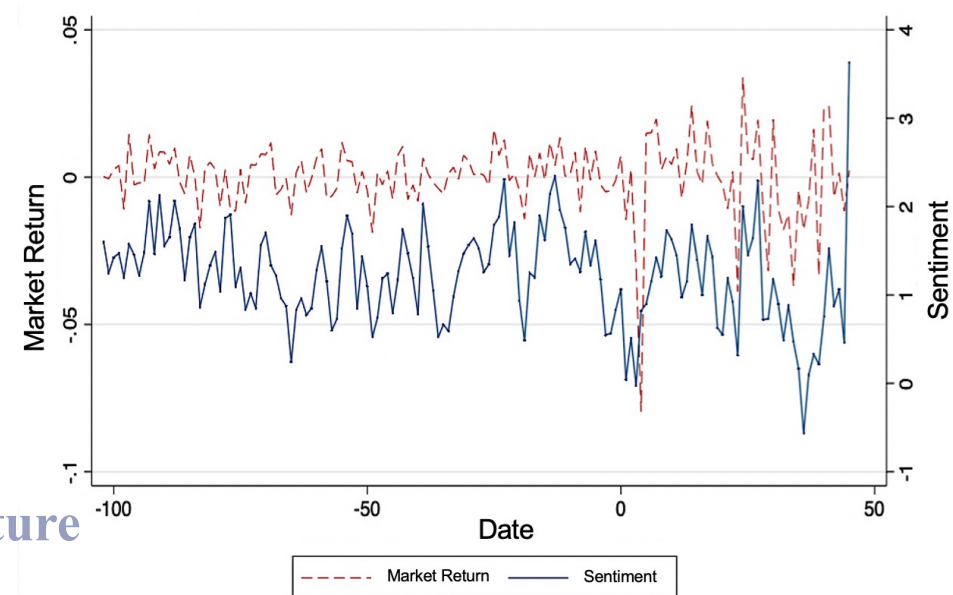
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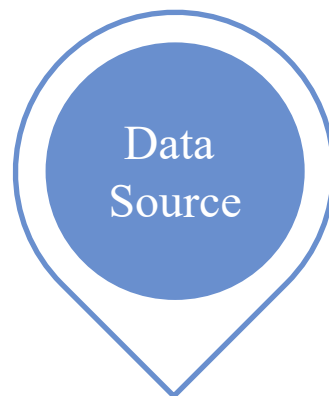
Phenomenon

- Market turbulence;
- Individuals with anxiety tend to be more pessimistic about future returns and take less risky investment strategies. (Kaplanski and Levy ,2010)



Literature

- Negative sentiment :
 - SARS and Ebola (Tao, 2010; Donadelli et.al., 2017)
 - COVID-19 (Liu et al., 2020; Baig et al., 2020)
- Stock price plummet (Al-Awadhi et al., 2020; Fallahgoul, 2020; Nadeem Ashraf, 2020; Shehzad et al., 2020)



Stock-related Financial Data

- GubaSenti
- CSMAR database
- China Securities Regulatory Commission



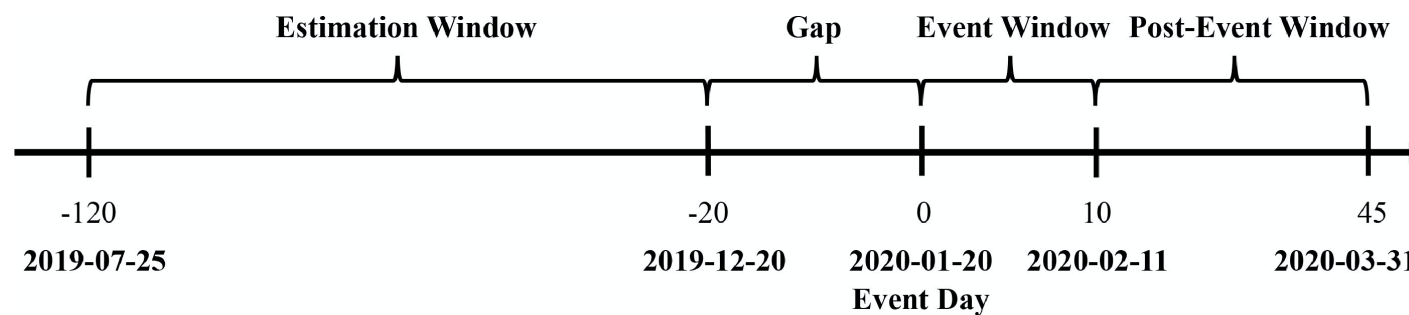
Abnormal Returns



Panel Data

$$R_{i,t} = \alpha_0 + \varphi MKT_t + \delta SMB_t + \eta HML_t + \gamma_1 SENT_{i,t} + \gamma_2 EW_t + \gamma_3 Li + \varepsilon_{i,t}$$

- Hausman test
- Fixed effect
- FGLS estimation



Summary Statistics

| Variable | Observations | Mean | SD | Min | Max |
|-----------------------------------|--------------|--------|-------|---------|--------|
| Panel A: Estimation Window | | | | | |
| Market return | 100 | 0.001 | 0.008 | -0.019 | 0.022 |
| Stock return | 324,729 | 0.001 | 0.022 | -0.102 | 0.103 |
| Sentiment | 324,729 | 0.486 | 2.636 | -19.880 | 21.463 |
| Panel B: Event Window | | | | | |
| Market return | 10 | -0.005 | 0.030 | -0.080 | 0.020 |
| Stock return | 31,475 | -0.005 | 0.046 | -0.103 | 0.104 |
| Sentiment | 31,475 | 0.431 | 2.728 | -10.912 | 12.024 |
| Panel C: Post-event Window | | | | | |
| Market return | 36 | -0.001 | 0.018 | -0.039 | 0.034 |
| Stock return | 106,164 | 0.000 | 0.034 | -0.109 | 0.103 |
| Sentiment | 106,164 | 0.627 | 2.550 | -10.533 | 11.527 |

Panel B: Event Effect

- Stock returns and individual investor sentiment both react negatively after the event day.
- Stock yield decreased and volatility.

Panel C: Reversal Effect

In the post-event window, both the return and sentiment rise, even exceeding the average level before the outbreak.

Event Study

| Event Windows | | [0,9] | | [10,45] | | | | |
|-----------------------------|--|-------------|-----------|-------------|---------|-------------|------------|--------|
| | | Obs. | | Average CAR | | T-Stats. | Weight | |
| Indices | | Average CAR | Obs. | T-Stats. | Obs. | Average CAR | T-Stats. | Weight |
| Pharmaceutical Industry | | 0.120 | 197 | 16.372*** | 0.120 | -0.052 | -10.837*** | 23.12% |
| Overall Market | Manufacture of computers, communication and other electronic equipment | 0.007 | 293 | 4.010*** | 0.033 | -0.016 | 4.879*** | 9.46% |
| Non-Pharmaceutical Industry | Software and information technology services | 0.000 | 177 | -0.062 | 0.044 | -0.015 | 5.159*** | 7.62% |
| Pharmaceutical Industry | Real estate | 0.120 | 108 | 16.372*** | -0.052 | -0.033 | -10.837*** | 5.49% |
| Hubei Province | Manufacture of special purpose machinery | 0.009 | 177 | 0.729 | 0.025 | -0.013 | 2.849*** | 4.33% |
| | Manufacture of chemical raw materials and chemical products | | 203 | | 0.015 | | 2.098** | 2.98% |
| Event Windows | | [-120, -21] | | [0,9] | | [10,45] | | |
| Indices | | CAR | P-Value | CAR | P-Value | CAR | P-Value | |
| Business Service Industry | | | 43 | | -0.057 | | -6.695*** | 2.40% |
| Pharmaceutical industry | | 0.024 | -0.031*** | 1919 | 0.120 | -0.010 | -0.120*** | 42.16% |
| Other Industries | | | | | | | | 0.018* |
| Non-Pharmaceutical | | -0.007 | | -0.000 | | | -0.033 | |

Event Window



- The epidemic has a significant positive impact on the stock price in the short term.
- The cumulative abnormal return in pharmaceutical industry is far higher than the average and the sample size from pharmaceutical industry is large.



Post-event Window

- The impact of the epidemic still exists in the long term and has a significant positive impact.
- It can be explained by the spread of the epidemic.
- The industrial differences are caused by this epidemic.⁶

Panel Regression

| | Sentiment Effect | | Reverse Effect | | Region Effect | |
|---------------------|-----------------------|-------------------------------------|-------------------------------------|--------------------------------------|-----------------------|----------------------|
| | FE | FGLS | FE | FGLS | FE | FGLS |
| $SENT_i$ | 0.005*** (114.55) | [-100, -0]0.004*** FE (113.85) | [0, 0.005]0.005*** FE (114.79) | [0, 0.005]0.005*** FGLS (114.07) | 0.005*** (114.79) | 0.004*** (114.07) |
| $MKT_{i,t}$ | 1.010*** (187.81) | 0.003***0.011*** (-194)(187.86) | 0.005***0.016*** (-114)(183.52) | 1.016***0.004*** (187.52)(187.86) | 1.016*** (187.52) | 1.017*** (187.86) |
| SMB_{MKT} | 0.604*** (54.62) | 1.020***0.607*** (-199.66)(4.86) | 1.010***0.625*** (-187.58)(4.86) | 0.628***0.628*** (55.40)(55.40) | 0.625*** (55.40) | 0.628*** (55.65) |
| HML_{SMB} | -0.108*** (-5.09) | 0.733***0.120*** (-110.44)(5.63) | 0.604***0.058*** (-54.82)(7.18) | -0.073***0.007*** (-3.18)(0.86) | -0.058*** (-2.67) | -0.070*** (-3.18) |
| EW_{HML} | | -0.102*** (-11.94) | -0.108***0.002*** (-5.09)(2.7) | -0.002***0.002*** (-9.27)(-5.63) | -0.002*** (-9.27) | -0.002*** (-9.31) |
| Location | | -0.001*** (-35.58) | -0.002*** (-25.43) | -0.001*** (-33.34) | -0.002*** (-23.89) | -0.000 |
| Other Hubei regions | | | | | | |
| adj. R-sq | | 0.272 | 0.477 | | (.) | (-0.29) |
| Wuhan City | | 30474.9 | 17404.1 | | 0 | -0.001 |
| N | | 317901 | 74455 | | (.) | 74455 (-0.77) |
| α_0 | -0.003*** (-25.43) | -0.002***0.001*** (-23.88)(7.1) | -0.001*** (-4.74) | -0.001*** (-3.92) | 754.7801*** (4.74) | -0.001*** (-3.85) |
| P-value | | | | | | |
| adj. R-sq | 0.477 | | 0.477 | | 0.477 | |
| F | 17404.1 | | 13956.8 | | 13956.8 | |
| N | 74455 | 74455 | 74455 | 74455 | 74455 | 74455 |

$$R_{i,t} = \alpha_0 + \varphi MKT_t + \delta SMB_t + \eta HML_t + \gamma_1 SENT_{i,t} + \gamma_2 EW_t + \gamma_3 L_i + \varepsilon_{i,t}$$



- ✓ Sentiment can significantly affect the overall market return during the epidemic.
- ✓ Stock returns depreciated during the post-event window.



No Area Effect

- Negative feelings are transmitted across China without distinction;
- The Spring Festival is included in the event window, which is the transportation peak during the year;
- Only companies registered in Hubei and Wuhan are included in the sample, thus excluding those who are not registered but conduct major business there.



The special impact of the epidemic

- For FE and FGLS, the P values are both 0.000, indicating that the impact of sentiment during the epidemic has increased significantly.

| | FE | FGLS |
|-------------------------------|-------------------------|-------------------------|
| | $R_{i,t}$ | $R_{i,t}$ |
| $SENT_{i,t}$ | 0.003*** (23.66) | 0.003*** (25.30) |
| $SENT_{i,t} \times PE_i$ | 8.29E-06*** (14.64) | 6.96E-06*** (13.23) |
| $SENT_{i,t} \times PB_{i,t}$ | 3.06E-04*** (13.84) | 3.08E-04*** (15.27) |
| $SENT_{i,t} \times CMV_{i,t}$ | 2.84E-14*** (8.44) | 1.12E-14*** (3.97) |
| $SENT_{i,t} \times Year_i$ | 1.63E-05*** (2.61) | 1.57E-05*** (2.73) |
| $SENT_{i,t} \times ISR_i$ | -1.40E-05 (-1.47) | -1.55E-05* (-1.78) |
| $SENT_{i,t} \times NA_i$ | -3.22E-14*** (-6.31) | -2.34E-14*** (-5.07) |
| MKT_t | 1.013*** (174.33) | 1.015*** (174.33) |
| SMB_t | 0.581*** (48.57) | 0.585*** (48.85) |
| HML_t | -0.111*** (-4.84) | -0.123*** (-5.35) |
| φ_0 | -0.003*** (-23.68) | -0.002*** (-21.77) |
| adj. R-sq | 0.487 | |
| F | 6023.2 | |
| N | 61832 | 61832 |

Characteristic Effect

$$R_{i,t} = \varphi_0 + \varphi_1 SENT_{i,t} + \varphi_2 SENT_{i,t} \times \mathbf{Feature}_i + \gamma MKT_t + \delta SMB_t + \eta HML_t + \varepsilon_t$$



$\mathbf{Feature}_i$ represents characteristics of stock i

Stocks with

- **higher P/E ratio,**
- **higher P/B ratio,**
- **higher circulating market value,**
- **lower institutional shareholding ratio,**
- **lower net asset,**

are more susceptible to sentiment during the epidemic.



This is possibly because the more resilient a company is to unexpected risks, the less anxious its investors are.

| | FE | FGLS |
|--|-----------------------|-----------------------|
| | $R_{i,t}$ | $R_{i,t}$ |
| $SENT_{i,t}$ | 0.005*** (8.09) | 0.004*** (7.96) |
| $SENT_{i,t} \times Industry_i$ | | |
| Oil and gas extraction | -0.004*** (-3.23) | -0.004*** (-3.25) |
| Petroleum and nuclear power processing | -0.004*** (-2.76) | -0.003** (-2.42) |
| Road transport | -0.004*** (-4.79) | -0.003*** (-4.42) |
| Railway transport industry | -0.004** (-2.00) | -0.003* (-1.84) |
| Coal mining and washing | -0.006*** (-4.43) | -0.003*** (-4.04) |
| MKT_t | 1.014*** (184.07) | 1.015*** (184.16) |
| SMB_t | 0.566*** (49.99) | 0.571*** (50.35) |
| HML_t | -0.068*** (-3.11) | -0.080*** (-3.69) |
| φ_0 | -0.003*** (-25.22) | -0.003*** (-23.46) |
| adj. R-sq | 0.488 | |
| F | 888.0 | |
| N | 68083 | 68083 |

Industry Effect

$$R_{i,t} = \varphi_0 + \varphi_1 SENT_{i,t} + \varphi_2 SENT_{i,t} \times Feature_i + \gamma MKT_t + \delta SMB_t + \eta HML_t + \varepsilon_t$$



Add dummy variable to $Feature_i$

Nearly half of the industries are significantly affected :

- 37 of the 71 dummy variables are significant;
- 30 industries have a weakening effect on the positive impact of sentiment.



- **The five industries with the most negative impact** are listed left: the oversupply of oil and the economic downturn, as well as the restrictions on travel;
- **The sentiment effect of only 7 industries**—the Pharmaceutical Industry, Internet and Related Services, Processing of Food from Agricultural Products, Software and Information Technology Services, Manufacturing of Computers, Communication and Other Electronic Equipment, Farming and Education—is boosted.

The Influence of COVID-19 on China's Stock Market

- Pandemics can cause widespread negative sentiment, thus leading to investor anxiety and market turbulence.
- The volatility of stock returns during the epidemic is influenced by sentiment and can't be explained solely by economic losses.
- Stocks with different financial characteristics and in different industries are affected differently.
- Sentiment effects of only seven industries, related to the Internet, education, medical manufacturing and agricultural production, are boosted.

CONCLUSION

Investment Advice

- Hold outstanding stocks of the pharmaceutical industry in the beginning stage.
- Reduce stockholdings in the pharmaceutical industry and increase stockholdings highlighted by government gradually.
- Stocks with high risk factors, such as high P/E and P/B ratios, high CMV, low institutional shareholding ratio, and low net assets, should be avoided during the middle and late stages of the epidemic.



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Thanks for listening!

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