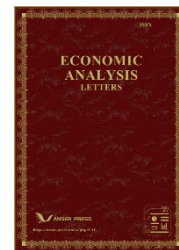




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The Impact of RCEP on Dual Circulation and Greater Bay Area — From the Perspective of China's Stock Market Conditions

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ABSTRACT

With the daily data from Nov 20, 2019 to Oct 31, 2022, this paper examines the dynamic nonlinear effects of RCEP on Dual Circulation and Greater Bay Area stock market from a quantile perspective. The rolling window quantile regressions detect the positive effects of RCEP on Dual Circulation and Greater Bay Area stock markets with significant time-varying characteristics. Meanwhile, QQ results show that the impacts from RCEP index are more significant under extreme conditions. In addition, we further use a nonparametric QC test to provide evidence on the predictive power of RCEP for Dual Circulation and Greater Bay Area with stock market.

KEYWORDS

RCEP; Dual Circulation; Greater Bay Area; Quantile approach

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1. Introduction

Facing the impact of the Covid-19 epidemic, sluggish global market demand, and more instable and uncertain situation of the world, President Xi Jinping, in July 2020, proposed the concept of a "dual circulation" development pattern in which domestic economic cycle plays a leading role while international economic cycle remains its extension and supplement. At present, development and analysis of recycling economy in China and abroad are hot topics of great concern to the academic circles, decision-makers (Guo, 2021; Yu and Zhou 2021; Wang et al., 2022; Wu and Chen 2022; Yifu and Wang, 2021; Guo and Gao 2022; Wan et al., 2022). With 15 Asia-Pacific countries signed the Regional Comprehensive Economic Partnership (RCEP) on Nov 15, 2022, RCEP, the world's biggest trade pact, will also help China deepen regional economic and trade cooperation and promote dual cycle development. And then, there are many studies focus on the relationship between RCEP and China (Zhang and Chen, 2022; Guo and Zhou, 2021; Zhang et al., 2023). The RCEP agreement will greatly help the economy of the Bay Area of China and Promote consumption, which can stimulate the vitality of regional development under the new development pattern of Dual circulation. More specifically, RCEP is the world's largest free trade agreement, which benefits 2.2 billion people and has a huge market capacity, which can further promote the integration of regional industrial chains and supply chains to provide new sources of growth drivers.

The combination of RCEP and Greater Bay Area is a new step to boost development of Dual circulation, since the Guangdong-Hong Kong-Macao Greater Bay Area is China's most powerful economic growth engine, and RCEP is the world's biggest trade pact. One of the important significances of the construction of the Guangdong-Hong Kong-Macao Greater Bay Area is to establish a new open economic system in line with international standards and to build a new platform for high-level participation in international economic cooperation. With China's accession to RCEP, the Guangdong-Hong Kong-Macao Greater Bay Area will become one of the important breakthroughs for in-depth cooperation between China and ASEAN under the RCEP agreement. And RCEP will also strengthen the supporting position of the Guangdong-Hong Kong-Macao Greater Bay Area in the construction of the "Belt and Road".

In recent years, the stock market with the concept of RCEP, dual circulation and the Guangdong-Hong Kong-Macao Greater Bay Area has attracted great attention from investors. Related activities are quickly reflected in stock market transactions, and information and risks are quickly transmitted among concept stocks. And Methods are used in the financial markets include TVP-VAR model (Li et al., 2022; Cao and Xie, 2022; Qiao et al, 2022), ARDL model (Nusair and Olson, 2022; Salem et al., 2022), multivariate GARCH model (Jiang et al., 2019; Yousaf and Ali, 2020; Hou et al., 2019; Meng et al., 2020) and so on. And the quantile methods are do well with the spikes and thick tails problem of financial data, are widely used in financial markets, like quantile-quantile (QQ) and causal quantile (QC) methods, which can show the different impact relationships of quantiles of markets (Sim and Zhou, 2015; Jiang et al., 2020; Jiang et al., 2020a). Therefore, this paper uses QQ and QC methods with high-frequency trading data from the stock market to analyze how the RCEP agreement affects the dual cycle and the development of the Guangdong-Hong Kong-Macao Greater Bay Area under different market conditions from an investment perspective.

The rest of this paper is as follows. Section 2 is methodology and data of this paper. Section 3 is the empirical results. Section 4 concludes the paper.

2. Methodology

Given the linkages between stock markets, the risk can quickly contagion. Therefore, considering the nonlinear relationship between stock markets, this paper uses the Rolling quantile regression and Quantile-on-Quantile (QQ) method and the Causality-in-Quantiles (QC) method to conduct a quantile analysis of the nonlinear relationship in the three stock indexes.

2.1. Quantile-on-Quantile approach

The QQ method combines the quantile regression model with a non-parametric estimation method, which can effectively study the market risk between different quantiles. Build the model as follows:

$$y_t = \beta^\theta(x_t) + u_t^\theta \quad (1)$$

where x_t represents RCEP stock index in period t , y_t represents stock market returns of dual circulation index and the Guangdong-Hong Kong-Macao Greater Bay Area index in period t , θ represents the θ th quantile of y_t , and u_t^θ represents the quantile residue.

And $\beta^\theta(x_t)$ needs to use a first order Taylor expansion to deal with it, as follows:

$$\beta^\theta(x_t) \approx \beta^\theta(x^\tau) + \beta^{\theta'}(x^\tau)(x_t - x^\tau) \quad (2)$$

where x^τ represents the θ th quantile of x , $\beta^{\theta'}$ represents the partial derivative of $\beta^\theta(x^\tau)$ to x_t . The following equation is obtained by replacing $\beta^\theta(x_t)$ in equation (1) with equation (2), and replacing $\beta^\theta(x^\tau)$ and $\beta^{\theta'}(x^\tau)$ with $\beta_0(\theta, \tau)$ and $\beta_1(\theta, \tau)$ respectively:

$$y_t = [\beta_0(\theta, \tau) + \beta_1(\theta, \tau)(x_t - x^\tau)] + u_t^\theta \quad (3)$$

2.2. Causality-in-Quantiles approach

We apply the nonlinear causality method to examine the causality-in-quantiles between dual circulation index and the Guangdong-Hong Kong-Macao Greater Bay Area index (y_t) and RCEP stock index (x_t). And we define the vectors $Y_{t-1} = (y_{t-1}, \dots, y_{t-p})$, $X_{t-1} = (x_{t-1}, \dots, x_{t-p})$, and $Z_t = (Y_t, X_t)$. The functions $F_{y_t|Z_{t-1}}(y_t|Z_{t-1})$ and $F_{y_t|Y_{t-1}}(y_t|Y_{t-1})$ are defined as the conditional distribution functions of y_t dominated respectively by vector Z_{t-1} and Y_{t-1} . the causality-in-quantiles hypothesis can be listed as:

$$H_0: P\{F_{y_t|Z_{t-1}}(Q_\theta(Y_{t-1})|Z_{t-1}) = \theta\} = 1$$

$$H_0: P\{F_{y_t|Z_{t-1}}(Q_\theta(Y_{t-1})|Z_{t-1}) = \theta\} < 1$$

And then, we examine the causality-in-variance cause the rejection of causality in the moment m may not means that non-causality happened in the moment k for $m < k$. The function is listed as follows:

$$y_t = g(X_{t-1}, Y_{t-1}) + \varepsilon_t \quad (4)$$

The high order causality-in-quantiles can be examined as:

$$H_0: P\{F_{y_t^k|Z_{t-1}}(Q_\theta(Y_{t-1})|Z_{t-1}) = \theta\} = 1, k = 1, 2, \dots, K$$

$$H_0: P\{F_{y_t^k|Z_{t-1}}(Q_\theta(Y_{t-1})|Z_{t-1}) = \theta\} < 1, k = 1, 2, \dots, K.$$

3. Data

To explore the impact of RCEP on the dual circulation index and the Guangdong-Hong Kong-Macao Greater Bay Area of China stock market, this paper chooses three stock indices to examine the interactive relationship between the RCEP and dual circulation and Guangdong-Hong Kong-Macao Greater Bay Area. The daily data with span from Nov 20, 2019 to Oct 31, 2022 are applied.

The RCEP Concept index (RCEP) are signed by 15 countries mainly includes: some subjects of overseas business that have important influence on the company in the fields of transportation, household appliances, electronics and mechanical equipment. The dual circulation index (Dual_Circulation) tracks the trend of demand side consumption, investment, export and independent science and technology fields under the background of internal and external dual circulation policies. The Guangdong, Hong Kong and Macao Bay Area Concept Index (GHMBA) refers to a city cluster formed by 9 cities, mainly involves: regional ports, real estate, infrastructure, transportation and other related enterprises. At the same time, in order to ensure the stability of variables, the data of agricultural commodities are processed by logarithmic difference transformation (Bin et al., 2022). All data are obtained from Wind Database.

Figure 1 show the price trend and return trend of the index; the price trends of the two indices of RCEP and the dual cycle are basically similar, and the overall trend is steadily rising; the GHMBA index shows a fluctuating trend in June 2020. During December 2020, the GHMBA index showed a significant decline. From the yield sequence, the three indexes have obvious fluctuations in early 2020, June 2020 and March 2022. Table 1 presents descriptive statistics for the three index return series. It can be seen that during the entire reporting period, the average returns of the three indices were all negative, and the fluctuations were relatively similar, with standard deviations around 0.6. All three series are stationary series according the ADF test.

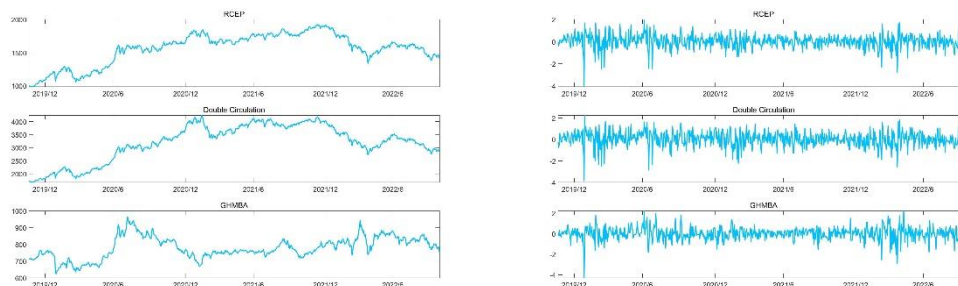


Figure 1. The trend and returns of three stock indexes.

Table 1. Descriptive statistics.

	Mean	Max	Mini	S. D.	Skew	Kurt	ADF
RCEP	-0.0853	1.2811	-1.2790	0.5783	0.0572	3.0681	-26.0157***
DC	-0.0992	1.4963	-1.5391	0.6151	0.3881	3.4090	-25.9290***
GHMBA	-0.0772	0.9061	-1.6729	0.5934	-0.6655	2.9961	-23.6307***

4. Empirical results

4.1. Rolling-window quantile regression

The rolling window quantile regression analyzes the time-varying impact of the RCEP index on the dual cycle index and the Guangdong-Hong Kong-Macao Greater Bay Area index under different market conditions. Figure 2 shows the rolling window quantile regression estimation results, showing the dependence of the lowest (10%) and highest (90%) quantiles of RCEP index returns on the returns of the dual cycle index and the Guangdong-Hong Kong-Macao Greater Bay Area index.

For the dual-cycle index, the impact of the RCEP index shows a positive dependence during most of the sample period (especially at the high quantile level), but only in part of the time (mainly concentrated in August 2021-December 2021) shows a negative dependence, and the fluctuation range of the coefficient in the highest quantile is significantly larger than that in the lowest quantile. This also shows that when the RCE index is bullish, it has a more active influence on the dual cycle market.

For the Guangdong-Hong Kong-Macao Greater Bay Area Index, the impact of the RCEP index is quite different from that of the dual-cycle index. There is almost no negative dependence during the sample period, and it shows obvious time-varying fluctuations. Specifically, the impact of RCEP on the dual cycle reached its maximum in September 2020, then continued to decline to the lowest point in 2021, and then maintained a high positive impact. The impact of the RCEP index on the Guangdong-Hong Kong-Macao Greater Bay Area Index is relatively similar under the two market conditions. Arguably, contagion is more pronounced in both bullish and bearish scenarios of risk.

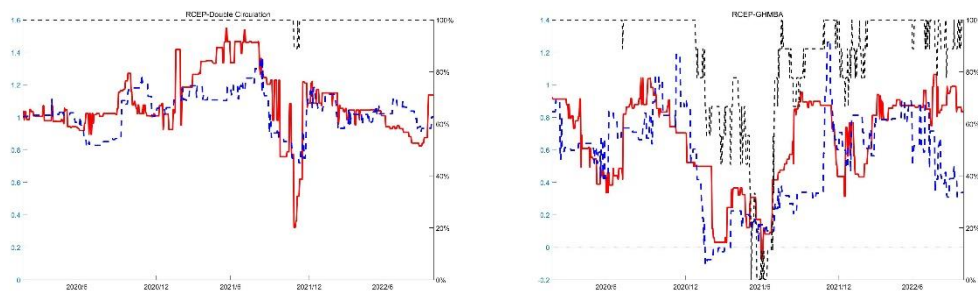


Figure 2. Results of Rolling quantile regression.

4.2. Quantile-on-quantile estimates

The results of the QQ method show that the two markets are affected by the RCEP index and show similar characteristics at different quantile points. Generally speaking, the impact of the RCEP index is positive, and the intensity of the impact on the Guangdong-Hong Kong-Macao Greater Bay Area Index will be lower than that of the dual-cycle index.

Secondly, the impact of the RCEP index at the same quantile point is relatively close; but the impact of the RCEP index at different quantile points shows obvious heterogeneity, among which, at the extreme quantile level (very low and extremely high), the impact is stronger under the middle and high risk quantiles, and the impact near the median (0.5-0.6) is the smallest. Therefore, it is necessary to be alert to the impact of RCEP under the extreme quantiles. According to the fitting effect of QR and QQR in Figure 3, the fitting effect of the model is better.

To sum up, there is generally a positive dependence relationship between the RCEP index and the dual-cycle index and the Guangdong-Hong Kong-Macao Greater Bay Area index, and the positive dependence of the dual-cycle index is stronger.

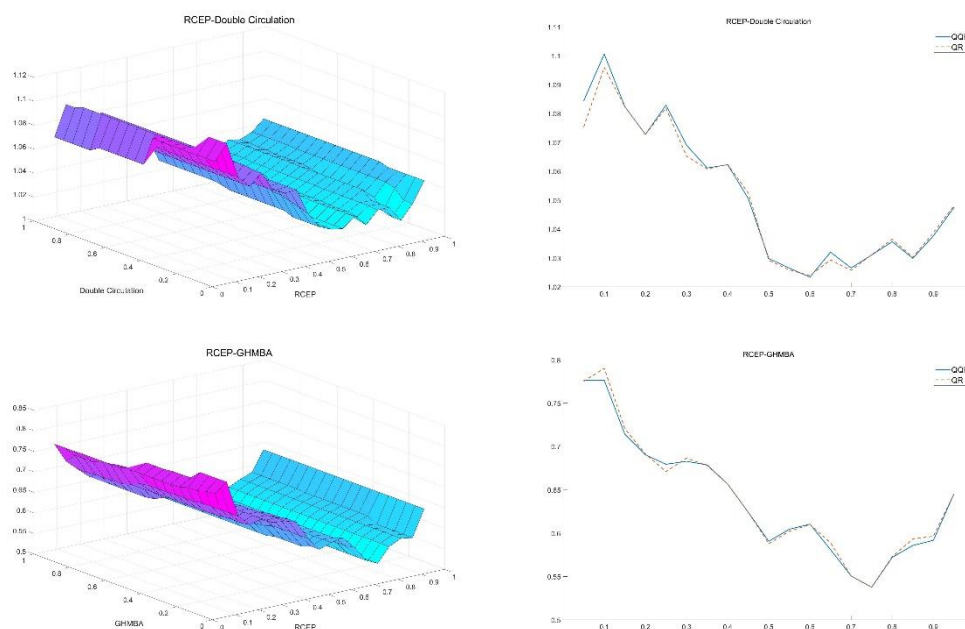


Figure 3. Results of QQ estimation.

4.3. Causality-quantile estimates

The figure 4 shows the results of the quantile causality of the mean and variance of the RCEP index and the

remaining two market index returns. The horizontal and vertical axes represent quantiles, respectively. The horizontal solid and dashed lines correspond to the 10% and 5% critical values, respectively. The results show that there is a clear difference between first-order causality (mean causality) and second-order causality (variance causality). There is strong evidence for variance causality, but weaker evidence for mean causality.

Specifically, there is a causal relationship between the RCEP index and the two markets; while the causal relationship between the RCEP index and the Guangdong-Hong Kong-Macao Greater Bay Area Index is significantly stronger than that of the dual-cycle index, and the RCEP index and the dual-cycle index are in the middle quantile. (0.4-0.8) there is a Granger causality, and the RCEP index and the Guangdong-Hong Kong-Macao Greater Bay Area Index have a Granger causality at most of the quantiles (0.2-0.8). It can be seen that the return of the RCEP index can predict the market return of the dual cycle index and the Guangdong-Hong Kong-Macao Greater Bay Area index to a certain extent, and there is a non-linear causal relationship between the two. The existence of volatility causation also means that there is a strong risk transmission from the RCEP market to the other two markets, leading to increased uncertainty, which in turn leads to higher risk premiums in the dual cycle index and the Guangdong-Hong Kong-Macao Greater Bay Area index market, so attention to the double cycle index Investors and decision makers in the circular market and the Guangdong-Hong Kong-Macao Greater Bay Area market should be more cautious about the impact of volatility from the RCEP market.

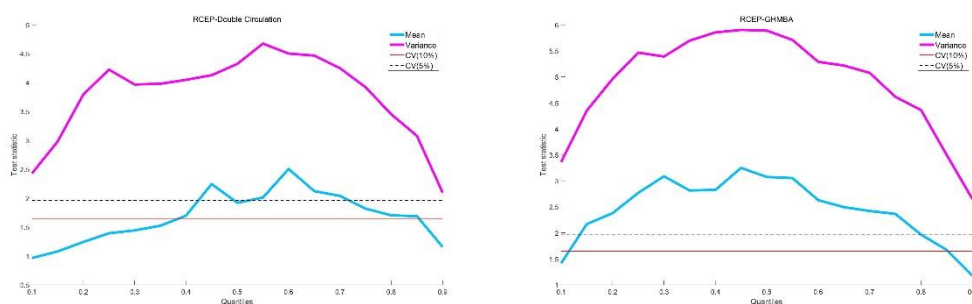


Figure 4. Results of QC methods.

5. Conclusion

This paper uses the quantile measurement method to study the impact of the RCEP market on the dual-cycle index market and the Guangdong-Hong Kong-Macao Greater Bay Area market from different quantile levels and time dimensions. The main research results are as follows: Rolling window analysis shows that the RCEP index has a positive impact, showing significant time-varying characteristics, and the impact on the double-cycle market is more obvious under bullish conditions; the results of the QQ method show that the two market is affected by the RCEP index and shows similar characteristics at different quantile points, and the impact is more significant under extreme conditions; the QC method shows that there is a causal relationship between the RCEP index and the two markets, and the RCEP index can not only effectively predict the double cycle Indices and Guangdong-Hong Kong-Macao Greater Bay Area Index market returns are more likely to have strong risk transmission.

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Declaration of Competing Interest

All the authors claim that the manuscript is completely original. The authors also declare no conflict of interest.

References

- Cao, G., & Xie, W. (2022). Asymmetric dynamic spillover effect between cryptocurrency and China's financial market: Evidence from TVP-VAR based connectedness approach. *Finance Research Letters*, 49, 103070. <https://doi.org/10.1016/j.frl.2022.103070>
- Guo, D., & Zhou, P. (2021). The rise of a new anchor currency in RCEP? A tale of three currencies. *Economic Modelling*, 104, 105647. <https://doi.org/10.1016/j.econmod.2021.105647>
- Guo, N. (2021). Reasons and Measures for the Development of " Double Circulation" in Post-Epidemic Period in China. *Frontiers in Economics and Management*, 2(2), 218-224. [https://doi.org/10.6981/FEM.202102_2\(2\).0026](https://doi.org/10.6981/FEM.202102_2(2).0026)
- Guo, Q., & Gao, R. (2022). Study on the Present Situation, Problems and Countermeasures of Dual Circulation Development in the Guangdong-Hong Kong-Macao Greater Bay Area. *Open Journal of Business and Management*, 10(4), 2127-2159. <https://doi.org/10.4236/ojbm.2022.104108>
- Hou, Y., Li, S., & Wen, F. (2019). Time-varying volatility spillover between Chinese fuel oil and stock index futures markets based on a DCC-GARCH model with a semi-nonparametric approach. *Energy Economics*, 83, 119-143. <https://doi.org/10.1016/j.eneco.2019.06.020>
- Jiang, Y., Jiang, C., Nie, H., & Mo, B. (2019). The time-varying linkages between global oil market and China's commodity sectors: Evidence from DCC-GJR-GARCH analyses. *Energy*, 166, 577-586. <https://doi.org/10.1016/j.energy.2018.10.116>
- Jiang, Y., Tian, G., & Mo, B. (2020). Spillover and quantile linkage between oil price shocks and stock returns: new evidence from G7 countries. *Financial Innovation*, 6(1), 1-26. <https://doi.org/10.1186/s40854-020-00208-y>
- Jiang, Y., Tian, G., Wu, Y., & Mo, B. (2022). Impacts of geopolitical risks and economic policy uncertainty on Chinese tourism-listed company stock. *International Journal of Finance & Economics*, 27(1), 320-333. <https://doi.org/10.1002/ijfe.2155>
- Li, H., Zhou, D., Hu, J., & Guo, L. (2022). Dynamic linkages among oil price, green bond, carbon market and low-carbon footprint company stock price: Evidence from the TVP-VAR model. *Energy Reports*, 8, 11249-11258. <https://doi.org/10.1016/j.egyr.2022.08.230>
- Meng, J., Nie, H., Mo, B., & Jiang, Y. (2020). Risk spillover effects from global crude oil market to China's commodity sectors. *Energy*, 202, 117208. <https://doi.org/10.1016/j.energy.2020.117208>
- Mo, B., Meng, J., & Zheng, L. (2022). Time and frequency dynamics of connectedness between cryptocurrencies and commodity markets. *Resources Policy*, 77, 102731. <https://doi.org/10.1016/j.resourpol.2022.102731>
- Nusair, S. A., & Olson, D. (2022). Dynamic relationship between exchange rates and stock prices for the G7 countries: A nonlinear ARDL approach. *Journal of International Financial Markets, Institutions and Money*, 78, 101541. <https://doi.org/10.1016/j.intfin.2022.101541>
- Qiao, X., Zhu, H., Zhang, Z., & Mao, W. (2022). Time-frequency Transmission Mechanism of EPU, Investor Sentiment and Financial Assets: A Multiscale TVP-VAR Connectedness Analysis. *The North American Journal of Economics and Finance*, 101843. <https://doi.org/10.1016/j.najef.2022.101843>
- Salem, L. B., Noura, R., Jeguirim, K., & Rault, C. (2022). The determinants of crude oil prices: Evidence from ARDL and nonlinear ARDL approaches. *Resources Policy*, 103085. <https://doi.org/10.1016/j.resourpol.2022.103085>
- Sim, N., & Zhou, H. (2015). Oil prices, US stock return, and the dependence between their quantiles. *Journal of Banking & Finance*, 55, 1-8. <https://doi.org/10.1016/j.jbankfin.2015.01.013>
- Wan, G., Wang, X., Zhang, R., & Zhang, X. (2022). The impact of road infrastructure on economic circulation: Market expansion and input cost saving. *Economic Modelling*, 112, 105854. <https://doi.org/10.1016/j.econmod.2022.105854>
- Wang, Z., Yu, Z., Ma, L., & Li, A. (2022). The Digital Economy and the Energy "Internal Circulation": Evidence from China's Interprovincial Energy Trade. *Sustainability*, 14(23), 15837. <https://doi.org/10.3390/su142315837>
- Wu, J., & Chen, T. (2022). Impact of Digital Economy on Dual Circulation: An Empirical Analysis in China. *Sustainability*, 14(21), 14466. <https://doi.org/10.3390/su142114466>
- Yifu, L. J., & Wang, X. (2021). Dual circulation: A new structural economics view of development. *Journal of Chinese Economic and Business Studies*, 1-20. <https://doi.org/10.1080/14765284.2021.1929793>
- Yousaf, I., & Ali, S. (2020). The COVID-19 outbreak and high frequency information transmission between major cryptocurrencies: Evidence from the VAR-DCC-GARCH approach. *Borsa Istanbul Review*, 20, S1-S10. <https://doi.org/10.1016/j.bir.2020.10.003>
- Yu, G., & Zhou, X. (2021). The influence and countermeasures of digital economy on cultivating new driving force of high-quality economic development in Henan Province under the background of " double circulation". *Annals*

of Operations Research, 1-22. <https://doi.org/10.1007/s10479-021-04325-4>

Zhang, C., & Chen, P. (2022). Applying the three-stage SBM-DEA model to evaluate energy efficiency and impact factors in RCEP countries. *Energy*, 241, 122917. <https://doi.org/10.1016/j.energy.2021.122917>

Zhang, W., Cao, S., Zhang, X., & Qu, X. (2023). COVID-19 and stock market performance: Evidence from the RCEP countries. *International Review of Economics & Finance*, 83, 717-735. <https://doi.org/10.1016/j.iref.2022.10.013>