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Sectoral Linkages in China's A-Share Market: Evidence from the RCEP Enforcement

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Abstract:

This paper aims to examine how the Regional Comprehensive Economic Partnership (RCEP) impacts China's A-share market. This analysis investigates how industry portfolios co-move in terms of daily returns across different sectors such as Machine & Equipment, Textiles & Apparel, Utilities, Telecom Services… An event-study approach is employed in this study, focusing on the 60 trading days before (pre-) and after (post-) official enforcement of RCEP. Sectoral Linkage indicators, including Pearson correlation matrices and Exponentially Weighted Moving Average (EWMA) model are established. The evidence shows that after enforcement of RCEP policy, the absolute correlations rise dramatically, however in the relative perspective the correlations increase more rapidly in the domestic demand-oriented industries rather than the export-oriented / supply-chain industries $(\Delta = -0.147)$. Also, the effect dissipates in short term as in trading days (80), the numeric value of Δ decreases.To move from observation to causal inference, a Difference-in-differences (DID) model is applied. This method compares the change in sectoral return linkage between treatment sector and control sector pairs preceding and following RCEP enforcement to attribute the shifts to policy shock. This analysis contributes to the understanding of how regional trade reshapes domestic share markets, providing references to investors in terms of optimizing stock allocation and regulators in designing balance policies.

Keywords: RCEP; A-share market; sectoral linkages.

1. Introduction

Regional Comprehensive Economic Partnership was officially signed on November 15th, 2020, and entered into force on 1 January 2022, which signifies the launch of the world's largest free trade area by population, economy and trade scale [1]. Evidence shows that Chinese manufacturing companies have experienced substantial growth, which indicates the strong linkage between economy and exporting in China. Thus, the policy provides an ideal setting to analyze co-movements in A-share market across different time horizons [2] [3].

Based on the previous findings, the broader literature on trade and sectoral linkages can be classified into two main strands.

Firstly, research on free trade agreements (FTAs) indicates that lowering tariffs and unifying rules of origin can reduce trading costs and reshape production networks. Quantified evidence on China indicates that high export-dependent industries such as Machine & Equipment, Textiles & Apparel are likely to benefit more with lower trading barriers, because they are embedded in supply-chain [4]. In contrast, the domestic demand-oriented industries such as Utilities, Power are highly supervised by government, therefore have limited impact facing FTAs and are highly sensitive to the domestic policy and macro factors [5]. These findings indicate that RCEP policy may have different impact against industries within the same country, with export-oriented industries becoming more closely related, and domestic-demand industries motivating by macro domestic factors.

Secondly, most recent studies are investigating the time-varying return co-movements in stock market under shocks. These studies emphasized that major crises or substantial policies amplify co-movements across various industry sectors. For example, Covid-19 period greatly affected correlations of oil, gold, and stock market [6] [7]. Similar patterns are found in the emerging markets by Phiri in 2023[8]. In Asia region, the study shows the dynamic correlations among RCEP members rise due to their reactions to different factors over time [9]. In China, recent research shows that macro shocks such as carbon neutrality, energy price swings affect the co-movements [10]. These findings suggest that sectoral heterogeneity are required to be considered when evaluating the impact of policy shocks on stocks.

Most of the existing studies concentrate on either the aggregate markets or cross-country sectoral linkages. However, research on co-movement of different sectors within a single domestic market remains scarce. It is still ambiguous how the co-movements of export-oriented market and domestic demand-oriented market in China's A-share market changed after the implementation of the RCEP policy.

This study addresses the gaps in three ways. Firstly, it provides perspective from the domestic industry level on impact of RCEP. Secondly, it uses the rolling-correlation and DID model to identify the time-varying property of the co-movements. Finally, it highlights the asymmetrical property between different industries and provides information for both investors and regulators.

Methodologically, this paper uses Pearson correlations and Exponentially Weighted Moving Average (EWMA) to measure how correlations evolve over time. EWMA is served as a practical proxy of Dynamic Conditional Correlation (DCC), because it is calculated more stable and easier in smaller sample size rolling-window estimation.

This study investigates two primary research questions and proposes a testable hypothesis. The first is whether the implementation of RCEP increases correlation in export-oriented/ supply-chain industries relative to other domestic dependent industries. The second is whether this result strongly depends on observation window, for example, 60 versus 80 trading days. Based on the potential profit of the industries, the paper proposes that RCEP significantly increased the co-movement among export-oriented / supply-chain industries than other domestic dependent industries. In addition, the effect is anticipated to be more pronounced in short window, but is expected to diminish in long run, demonstrating the gradually absorbed feature.

2. Research Design

This paper discusses whether RCEP's enforcement on 1 January 2022 reshaped the sectoral co-movement in China's A-share market, then document the trend and quantify the effect of this policy. The sample comprises portfolios constructed as equal-weighted averages of constituent stocks, yielding a consistent daily panel from May 2021 to July 2022. Data are sourced from Tonghuashun and DongCai and retrieved via the Python package akshare. For industries, 8 different industries are chosen, with Machine & Equipment, Textiles & Apparel, Automobiles, Ports & Shipping, Utilities, Power, Telecom Services and Environmental Services respectively. The front four industries are the treatment group (PP), because they are strongly connected to the export-oriented and supply exposed sectors. The latter four industries are the control group (CC), as they are more domestic oriented, hence they are not strongly affected by this policy. The stocks are separated into two periods, with the time before 1 January 2022 as the pre- sector, and the time after as the post- sector.

These sectors were chosen due to their ability to provide a significant contrast between export-oriented and domestic-demand-oriented industries. Furthermore, these industries cover major high quality and high liquidity sectors among China's A-share market.

2.1 Export-oriented Industries

Machine & Equipment and Automobiles: Major manu-

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facturing clusters with significant export shares, and deep integration into the Asia supply chain

Textiles & Apparel: One of China's most export-dependent industries

Ports & Shipping: Critical infrastructure which directly facilitates cross-border trade

2.2 Domestic demand-oriented Industries

Utilities and Power: Highly supervised by government, and are almost entirely reliant on domestic demand

Telecom Services and Environmental Services: largely state-dominated, have weak connection with international trade

The selection aims to maximize differences between trading exposure while ensuring sufficient data availability for robust time series analysis. In addition, this grouping follows previous studies on trade liberalization and sectoral heterogeneity [3], which distinguish tradable manufacturing sectors from non-tradable service sectors to analyze differences in co-movements after policy shock.

The co-movement variations are discussed in two complementary ways. Firstly, the paper computes the rolling Pearson correlation matrices for each industries pair for two different windows: 60, 80 trading days. For everyday t, the analysis aggregates the correlations into within-treatment and within-control averages denoted by $\bar{\rho}_{PP},t$ and $\bar{\rho}_{CC},t$. The heatmaps are plotted to visualize the difference of treatment groups and control groups on pre- / post-days with different trading days. The model estimates the gap between the two values as $Gap_t = \bar{\rho}_{PP},t - \bar{\rho}_{CC},t$. The positive number value indicates the stronger synchronicity among treatment groups relative to control vice versa.

To identify the policy-driven shift, a pre-post specification is listed, for each window $W ? \{60,80\}$,

$$Gap_t = \alpha + \beta POST_t + ?_t \tag{1}$$

$$POST_t = 1\{t \geqslant 01/01/2022\} \tag{2}$$

Hence, $\beta = E\left[Gat_t \mid POST = 1\right] - E\left[Gat_t \mid POST = 0\right]$ quantifies change in co-movement before and after the enforcement of RCEP. Equation 1 is esitimated by OLS model, and HAC (Newey-West) is printed as standard errors to account for heteroskedasticity and serial correlation.

To capture the heterogeneous effect under policy shock, the DID model is established in extending equation (1)

$$Gap_{it} = \alpha + \beta\left(Post_t \times Export_i\right) + \gamma Post_t + \delta Export_i + ?_{it} \tag{3}$$

In (3), $Export_i = 1$ stands for the export-oriented industry, $Export_i = 0$ stands for the domestic demand-oriented industry. Gap_{it} indicates the average correlations in a certain group. If β is a positive value, it indicates RCEP has stronger co-movement within treatment group, vice versa.

The second model is the Exponentially Weighted Moving Average (EWMA). This model is used to capture smoothed dynamic covariance matrices, through assigning higher weight on recent data. EWMA updates the conditional covariance matrix H_t:

$$H_t = \left(1-\lambda\right) r_t r_t^T + \lambda H_{t-1} \tag{4}$$

$r_t = \left(r_{1,t}, \ldots, r_{N,t}\right)^T$ denotes the vector of daily log returns of N industry portfolios at time t, and $0 < \lambda < 1$ is the smooth factor ($\lambda = 0.94$) [11]. The EWMA model is used as a practical proxy for DCC. The decision to employ EWMA rather than DCC stems from the former's ability to update variances and covariances with exponentially decaying weights, which in turn, allows a significant reflection of recent market shocks. Compared with DCC, EWMA has fewer parameters and does not involve the complex optimization process contained by GARCH models. For this reason, for small sample sized calculation, EWMA has better computational efficiency and numerical stability [11]

Finally, the difference-in-differences estimation is constructed.

3. Empirical Results

In figure 1, the correlations between industries with respect to days and treatment/control groups are calculated, and then the gaps between them by 60 trading days window are calculated. These results indicate that after the enforcement day (01/01/2022, vertical dash line listed), the gap is notably smaller than the gap before enforcement, and during most time the gap is smaller than 0. After subtracting the average post- values from the average pre- values, the result $\Delta = -0.147$ is shown, this indicates that the domestic demand-oriented industries increase their correlations more than the export-oriented /supply-chained industries, which opposes the hypothesis that treatment group (PP) has better correlation in short term.

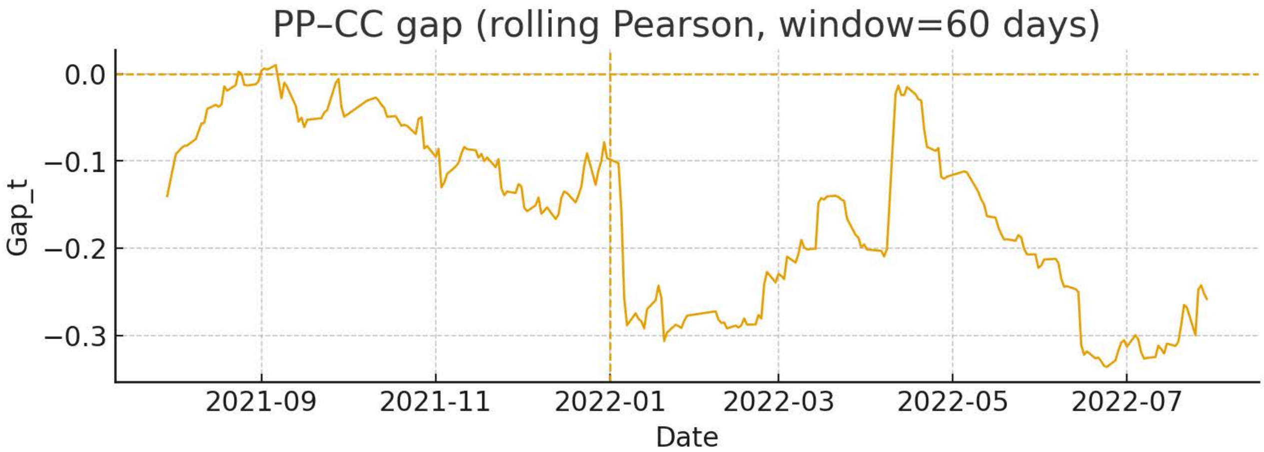

Fig. 1 PP-CC gap (60-day rolling Pearson)

In figure 2, the same method is done as in figure 1 but with longer trading days, (rising from 60 to 80), in this map all gap is below 0, and the $\Delta = -0.140$. In longer trading time range, domestic demand-oriented industries also show better correlations than the export-oriented industries. To emphasis, stronger co-movement in the control group does not indicate the reduction of co-movement in the treatment group, it only implies that the increasing rate of treatment group is smaller than that of the control group, which can be seen in the next two plots.

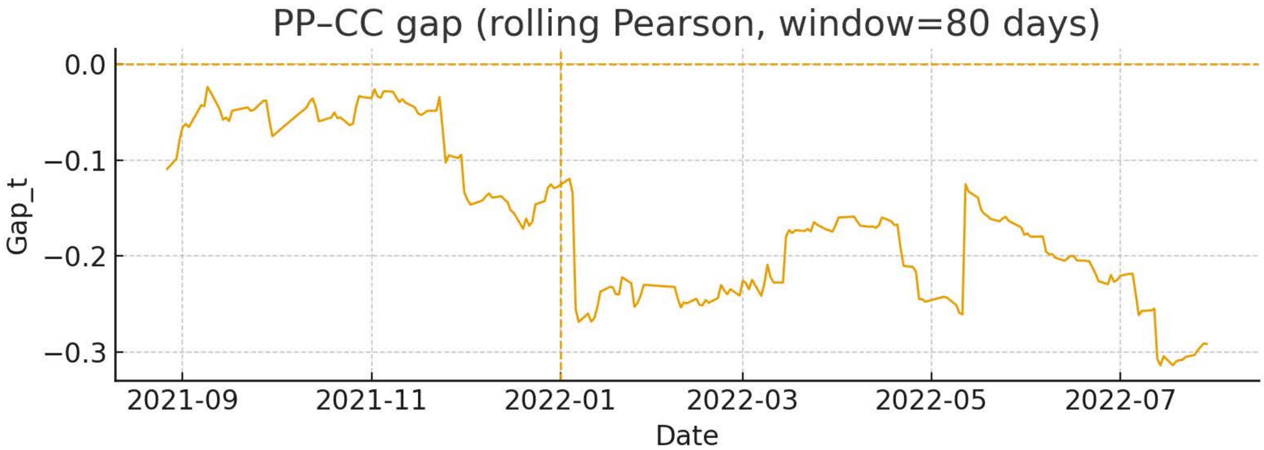

Fig. 2 PP-CC gap(80-day rolling Pearson)

Figure 3(60 trading days heatmaps) and Figure 4(80 trading days heatmaps) compare sectoral correlation between pre- and post- heatmaps using the same color cells. Both treatment and control blocks show a increase in color intensity from pre- to post-, indicating that the overall co-movements become stronger. These maps follow the previous emphasis.

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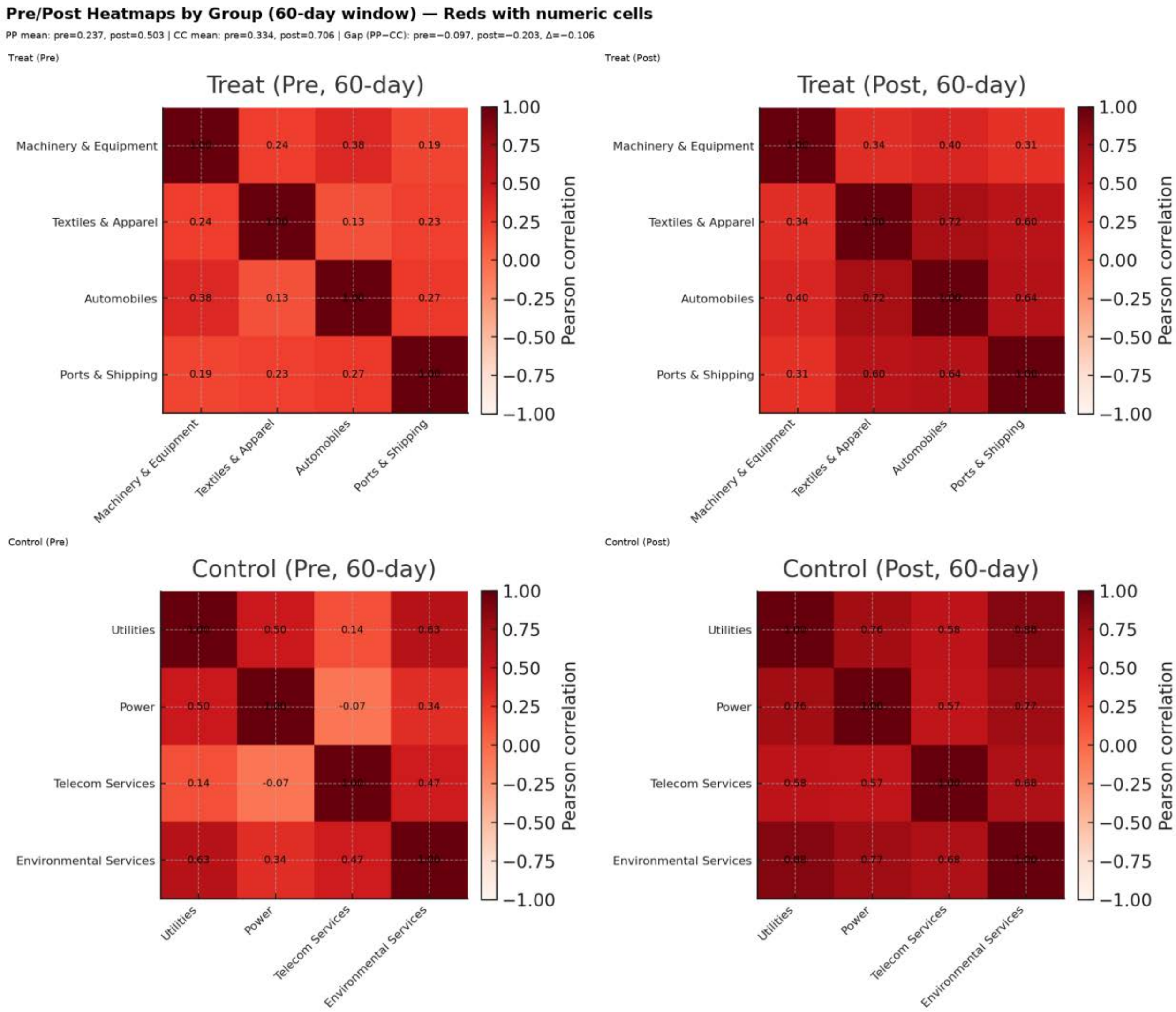

Fig. 3 Pre-/Post- heatmaps by group (60-day window, red color map with numeric cells)

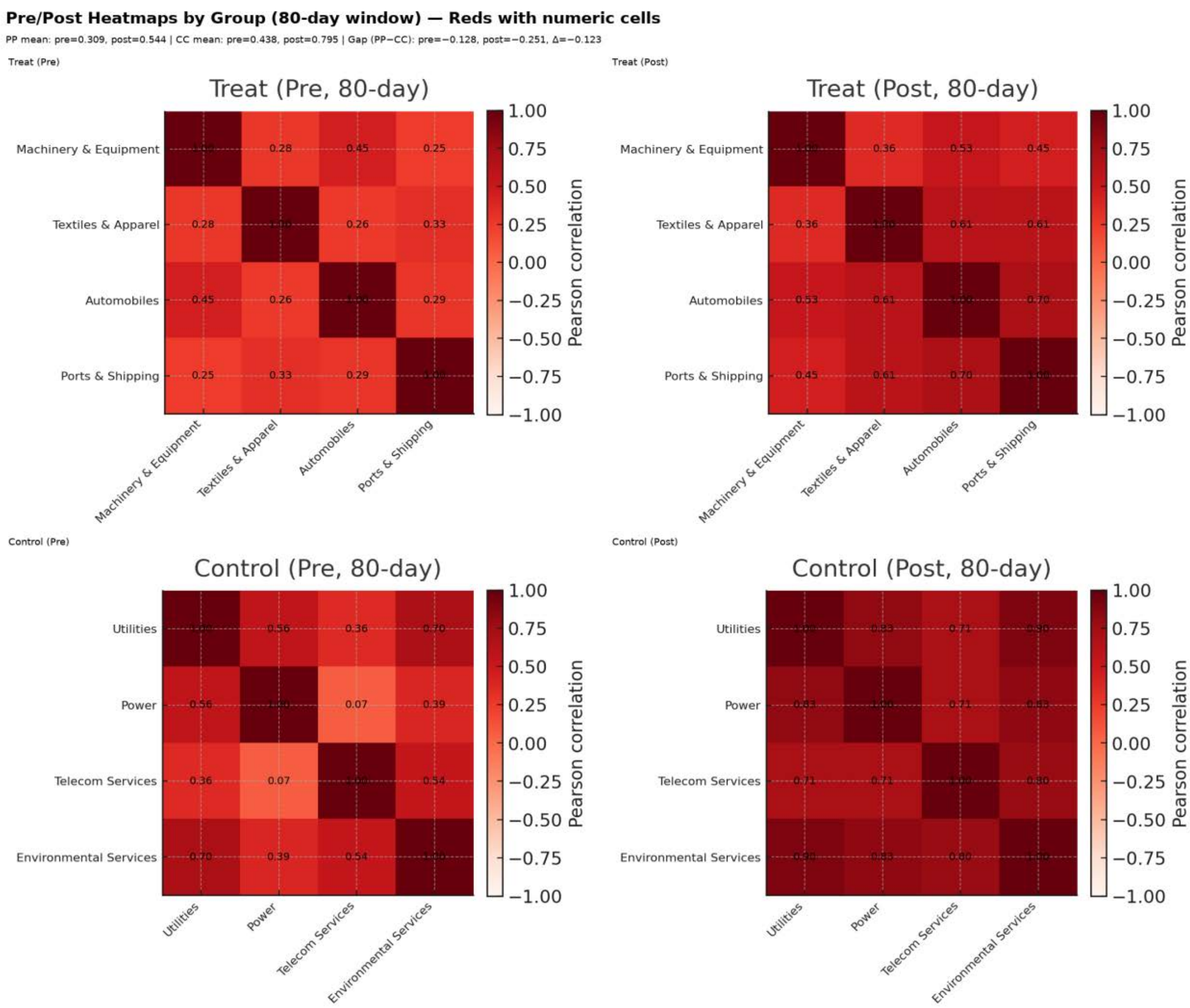

Fig. 4 Pre-/Post- heatmaps by group (80-day window, red color map with numeric cells)

Finally, figure 5 uses EWMA $(\alpha = 0.06, \lambda = 0.94)$ to get the approximation of the dynamic-correlation. The PP-CC gap is also used to construct the plot (01/01/2022, vertical dash line listed, zero-line, horizontal dash line). The result is computed by $\Delta = -0.053$ which also have the same result as the previous rolling Pearson correlation does.

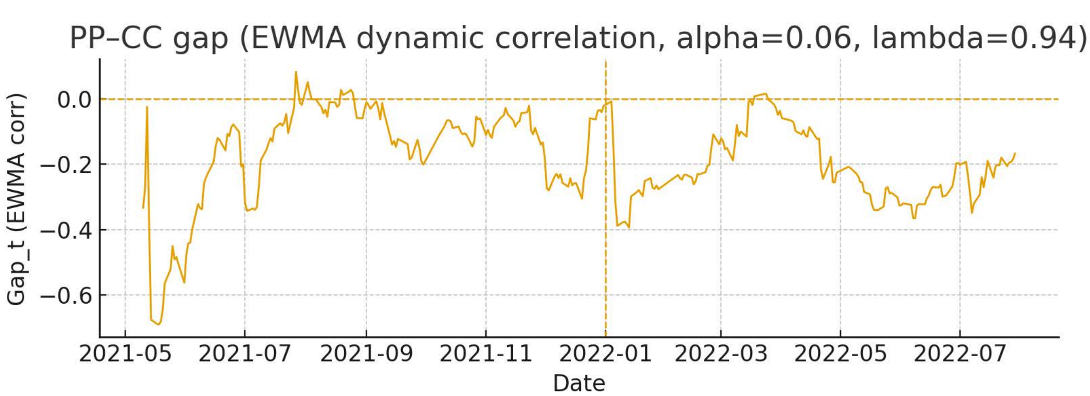

Fig. 5 PP-CC gap based on EWMA dynamic correlation with alpha = 0.06, lambda = 0.94

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Table 1-2 shows that the Post × Export coefficient remains negative for both windows, -0.147 for 60-day rolling window and -0.140 for 80-day rolling window. This indicates that, although the general correlation increases after enforcement, the increase is smaller for export-oriented industries relative to domestic demand-oriented industries. The R^2 values are approximately between 0.33-0.35, indicating that the DID model explains a substantial share of the variation in correlations.

Table 1. DID estimation of sectoral co-movement by 60 day window, $R^2 = 0.333$.

Variable	Coefficient	t-test	p-value
Post × Export	-0.1467	-2.31	0.021
Post	0.2619	5.15	<0.001
Export	-0.0757	0.0444	0.0885
Constant	0.4350	10.37	<0.001

Table 2. DID estimation of sectoral co-movement by 80 day window, $R^2 = 0.348$.

Variable	Coefficient	t-test	p-value
Post × Export	-0.140	-1.98	0.048
Post	0.2485	4.13	<0.001
Export	-0.0777	-1.46	0.1435
Constant	0.4284	8.43	<0.001

Together with figure 1-5 and table 1-4, the two previous questions are obtained, and the hypothesis is tested. For question one, the experiments are counterintuitive - PP>CC. In 60 trading days graph, the gap is somewhere above zero before the enforcement and the gap sustains to be below 0 after enforcement. This result indicates that the RCEP policy may be shaded by other policies. The hypothesis for question two is correct, as the longer time zone mitigates the effect of the policy (from -0.147 to -0.140) which shows that in longer time range the result is more robust.

Table 3. Pre/post means of the PP–CC gap (rolling Pearson) by window.

Window	PP_pre	PP_post	Delta
60-day	-0.076	-0.222	-0.147
80-day	-0.078	-0.218	-0.140

Table 4. EWMA pre-/post- means for PP, CC group, and PP-CC gap.

Metric	Value
rho_PP (pre)	0.255
rho_PP (post)	0.494
rho_CC (pre)	0.414
rho_CC (post)	0.707
Gap (pre)	-0.159
Gap (post)	-0.213
Delta (post-pre)	-0.053

4. Discussion

This paper tests whether the enforcement of RCEP policy would strengthen the co-movements of export-oriented industries more than the domestic-demand-oriented industries in China's A-share market. In contrast to the hypothesis, the gap between treatment and control group remained to be negative in general after 01/01/2022, indicating that the magnitude of increase in market linkage was more pronounced for the domestic-demand-oriented industries. Figure 1-2 show the rolling Pearson correlations under 60- and 80- trading days' window, both windows demonstrate that the gap between treatment and control group was below zero but with different magnitudes. Figure 3-4 illustrate that there is a general increase for both groups in correlations, but the magnitude is greater for the control group. Figure 5 has a similar pattern to the rolling Pearson correlations, but with a short interval of positive values in March 2022. This brief positive spike may reflect a revaluation of export-oriented sectors by the market several weeks after the enforcement of RCEP, when some potential trade benefit information, and the early sign of supply-chain realignment were released. At the same time, global recovery from the Covid-19 and the turbulence in global prices may have temporarily increased in sectoral co-movements in the export-oriented industries. However, this optimism was not sustainable, the reduction in tariffs and supply-chain reallocation showed less importance than the domestic policy shocks, causing the gap to return negative again.

Several mechanisms help explain this counterintuitive pattern.

1) The layback property of trade benefits

Although RCEP reduced trade costs through tariff schedules and rules of origin, the adjustment for enterprises can be a long process, including capacity reallocation, supply chain negotiation, logistics rerouting. Within the 60- and 80- trading days window, these changes in synchronization among export-oriented industries are covered by execution frictions and anticipation noise.

2) Common-factor dominance in the same period

From 05/2021 to 07/2022, macro factors such as the recurrent pandemic waves, energy price swings were likely to have more impact on regulated and domestic-demand-oriented industries, producing higher correlations within control groups.

3) Domestic policy shocks

During the same period, national regulations on energy-price swings, carbon-neutral transition and pandemic policies were imposed, providing coordinated cash-flow news in these sectors, thus leading to stronger correlations.

From a practical perspective, this paper implies that RCEP does not benefit all export-oriented industries uniformly. For investors, findings suggest that in the short run the selection of portfolios may not concentrate on the single industry that the policy directly benefits (such as export-oriented industries), because several policies can cause turbulence. Through monitoring the supply-chain reallocation time horizon and reduction in trade frictions, there may be opportunities that can be captured in medium term and long term.

For regulators, the evidence implies that when multiple policies are imposed, domestic-demand-oriented industries increase their correlation significantly, continuously monitoring the sectoral dependence may help identify macro risks and guide subsequent policy enforcement. Also, regulators should avoid excessive strengthening one industry when designing the industrial measure.

Overall, the study contributes to the literature by the switch in perspective from the cross-country co-movement to single market correlation distribution, inducing the existence of absolute increase in co-movement and the variation in co-movement in different industry-groups. This evidence provides a hidden perspective in this literature that provides both academic insights and practical reference for market participants.

5. Conclusion

The paper examined whether the enforcement of the RCEP policy affects the sectoral co-movement in China A-share market. Using equal-weighted industry portfolios through rolling Pearson matrices, EWMA model and DID model, the results show that the absolute correlations increased. Although the negative difference between the control and treatment group persisted, indicating a more pronounced rise in co-movement for domestic-demand-oriented industries, this finding suggests the influence of broader domestic factors outweighs the specific impact of RCEP enforcement.

The contribution concentrates on shifting perspective towards the reallocation of the co-movement in different industries and providing new evidence on policy effect to domestic stock market. For investors and regulators, the results remind the importance of balance portfolio construction, and caution to the broader hidden risks.

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