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Policy Momentum Harvesting in the Chinese A-shares Market

Ryan Bian* 

Proprietary Trader, Acubens Shipping and Trading, Singapore

***Corresponding Author:**

Ryan Bian, Proprietary Trader, Acubens Shipping and Trading, Singapore.

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Abstract

It is understood that traditional momentum strategies have performed inconsistently in the Chinese A-shares market, but value strategies have performed well. This paper argues that such variability arises from regulatory policy cycles acting as exogenous shocks that conditionally drive momentum, amplifying trends during easing phases while disrupting them during tightening phases. In this context, momentum should be viewed as a time-varying and natural consequence of regulatory policymaking. We incorporate spanning tree networks to isolate momentum pockets during such regulatory shocks. Drawing upon data from 2010 to 2025, the objective is to explore a dynamic process through the application of minimum and maximum spanning trees within a case study framework. Our focus will be on six pre-selected regulatory events, which will be mapped onto equity market clusters identified through tree-based methods. We believe that the experiment will provide a renewed opportunity for researchers and market participants to reignite the development of a better understanding of the momentum anomaly, particularly during market dislocations in the context of Chinese A-shares. Our fundamental contribution lies in two aspects: first, we link market regime shifts to regulatory events and engage with relevant A-shares literature from a practical perspective; second, we provide a helpful empirical case study to hopefully inform academics and practitioners on the never-ending topic regarding the essence of the momentum factor.

Keywords: Momentum, Regulatory Shocks, Factor Investing, Stock Market

JEL Classification: G12, G14, G18

Introduction

The Chinese A-shares market has experienced dramatic volatility and growth since 2010, influenced by regulatory policies that alternate between easing and tightening [1]. Traditional momentum strategies, which buy past winners and sell past losers, perform inconsistently in this environment, often failing during periods of regulatory tightening. This paper posits that momentum in A-shares is not merely a behavioural anomaly, but is conditionally driven by regulatory cycles. Easing policies create positive shocks that amplify trends within specific equity clusters, while tightening policies disrupt these trends but create opportunities for reversal harvesting within identifiable distressed groups. We argue that the weak or negative momentum documented in A-shares is a function of regulatory policy leading to aggregate momentum weakness, rather than an entire absence of the anomaly. By providing an experimental process to model regulatory shocks, the paper aims to elicit further work for developing a proper understanding of momentum factor performance at the intersection of regulatory shocks and network topology in the context of A-shares.

Our empirical investigation across six pre-selected major regulatory events (detailed below) reveals a nuanced picture. While aggregate momentum factors can indeed exhibit weakness in Chinese A-shares, we find support for the view that momentum manifests within policy-conditioned clusters: emerging during easing phases via maximum spanning tree identification of growth-linked groups and reversing during tightening phases via minimum spanning tree isolation of distressed clusters. In addition, our work has implications on the topic of boundary conditions during high-order 'fat tail' events for momentum pockets. These findings temper enthusiasm for network-based approaches during systemic

collapses, positioning our work as a trial identification method for tradeable market dislocations in the context of moderate regulatory shocks, rather than as a production-ready system for navigating genuine universal correlation spikes.

It is a common view held by practitioners that retail dominance and their so-called 'irrationality' contribute to the lack of momentum in A-shares, but this overlooks how targeted regulatory shocks can reinvigorate trends in specific clusters of stocks. This paper addresses this fundamental issue by integrating network clustering to isolate 'rideable' momentum groups, offering a more holistic framing that challenges simplistic behavioural or arbitrage-limit interpretations. Our work will concentrate on using preselected ex-ante events to test the potential of our approach for recognising momentum patterns amid ex post dislocations.

The remainder of this paper is organised as follows. Section 2 reviews the literature on momentum anomalies in A-shares and network-based approaches. Section 3 describes our data and methodology, including the spanning tree construction, cluster detection, portfolio formation, and portfolio construction. Section 4 presents our empirical results across six regulatory events. Section 5 concludes with implications.

Literature Review

The momentum anomaly, i.e., the persistent outperformance of recent winners over losers, has been extensively studied, yet its manifestation in emerging markets such as China remains inconsistent. It is well understood that traditional week-to-month price momentum often underperforms or reverses in China's A-shares market viewed as a function of high retail participation, capital controls, and government window guidance (in practitioner parlance) [2]. An alternative account of prior work also attributes weak momentum to behavioural biases and limits to arbitrage [3]. Still, it largely overlooks the conditioning role of institutional features specific to the policy-driven aspect of the Chinese A-shares market. As an interesting attempt to examine the missing locality context of the A-shares market, argued that momentum effects were strong pre-2005 but dissipated thereafter, attributing this to an evolving investor composition, with more uninformed and noise traders flooding the market, leading to higher volatility and turnover that erode trend persistence [4]. Furthering the perspective of persistence, it is worth noting that momentum performance is heterogeneous across A-shares, as observed amongst stocks under regulatory constraints [5]. Building a new framework to examine the influence of these constraints on the aggregate momentum factor has great potential.

Asymmetric 'jump' patterns for the momentum factor in volatile markets further suggest that the factor is likely to have state-dependency [6]. Past evidence finds that the asymmetry is stronger after market downturns in A-shares [7]. These findings underscore an interesting puzzle: if momentum arises from underreaction to information (as in rational models) or behavioural herding, why is it so fragile in China? Critically, much of the literature treats policy interventions as background noise rather than primary drivers. A recent study on economic policy uncertainty shows it dampens momentum by reducing trend persistence amid unclear signals [8]. Still, it has a reverse problem (to the above) of using aggregating proxies without direct ex-ante shock identification. We believe that our work can add value to existing threads of work by viewing policy shocks as a natural component of the A-shares market and inspecting the explainability of whether such shocks can function as a market 'turning point'.

Complementing this, a parallel literature in financial networks uses graph theory to map stock interconnections and the transmission of shocks. Pioneered in early work, minimum spanning trees (MSTs) derived from return correlations provide a parsimonious way to filter complex networks into hierarchical clusters, revealing sectoral groupings or risk-propagation paths [9]. Reasonable extensions can apply MSTs during crises to show tightened clustering as correlations spike, or in optimal portfolio construction to enhance diversification by selecting low-linkage assets with more reliable backings [10]. As for maximum spanning trees (MST), with a specific focus on strongest positive linkages, have been used to track investor herding or bubble dynamics [11]. Spanning tree methods have proven robust at identifying how shocks ripple. For instance, the central node in a minimum spanning tree structure can act as a transmission hub during volatility expansions [12]. In the global equity context, MSTs exhibit some predictability in their responses to events, providing visual insights into affected clusters [13]. However, applications to factor timing remain scarce. Some studies do explore causal networks to select factors or assess volatility connectedness across different themes [14]. Yet, only a handful examine momentum anomalies via the explicit specification of the spanning tree method. One notable example is the seminal work by which leans more towards classic Fama-French extension than towards shock-induced clustering [15].

On the other hand, spanning tree structures exhibit instability with respect to estimation windows: hierarchies and cluster compositions can shift markedly between short and longer (months) horizons; as brief windows amplify noise while extended ones smooth transient dynamics that will carry non-trivial interpretation differences [16,17]. In a smaller sample universe, small-sample biases can exacerbate chain effects, in which peripheral nodes link indirectly through hubs, distorting sectoral interpretations and inflating apparent connectivity [18,19]. Underlying these issues, some correlation specifications (Pearson correlations) of the tree methods also assume linearity. They are brittle to the non-Gaussian, fat-tailed distributions characteristic of financial returns, rendering them sensitive to outliers and potentially overstating dependencies during volatile periods [20]. These limitations notwithstanding, the parsimony and visual interpretability of spanning trees make it especially suitable for real-time use by practitioners in policy-dislocated regimes.

Overall, a clear research gap remains: the existing factor research literature on the topic of Chinese A-shares momentum appears to lack a simple, visualisable tool to identify which equity groups will exhibit amplified price persistence trading into regulatory events. We argue that spanning trees are positioned to address this issue directly: minimum to capture defensive or negatively correlated clusters during market drawdowns, and maximum to capture growth-linked groupings during market excesses, providing an intuitive filter to isolate 'rideable' trends without imposing practical constraints on machine learning or orderbook-level compute. Our work bridges the gap by applying spanning tree clustering to major regulatory shocks, enabling the timing of momentum strategies centred on shock-propagated clusters. Our approach overcomes the drawbacks of traditional momentum metrics in A-shares (such as reversal dominance or negative spread) and proposes that policy-conditioned clustering reveals price persistence. This challenges the notion that momentum is absent in China due to market immaturity by viewing regulatory shocks as the mechanism that drives equity clustering, thereby restoring sectoral momentum even when aggregate signals falter.

Data and Methodology

On Data

In our research, we utilise the iFind database and the yfinance API to access monthly data on price, trading volume, and trading characteristics for all A-shares stocks from 2010 to 2025. Our stock universe for clustering testing is defined as the top 50 A-shares stocks sorted by customised volume-weighted average price (VWAP) over the previous month, chosen to prioritise liquidity and minimise slippage in real-world execution, as regulatory shocks propagate more reliably in high-volume stocks. We acknowledge the critique that we are overlooking less-liquid stocks that may be more sensitive to regulatory shocks. As used in industry practice for liquidity-based stock selection, we argue that capturing both price levels and trading activity, which determine execution feasibility, is more critical for practical sizing decisions.

	open	high	low	close	volume
count	300480	300480	300480	300480	300480
mean	11	12	10	10	440801249
std	30	33	29	28	894972098
min	0	0	0	0	0
25th percentile	5	5	4	4	100723688
50th percentile	7	8	7	7	216386691
75th percentile	12	13	11	11	468207225
max	2222	2628	2067	1944	45876502917
Source: Author.					

Table 1: Reports The Descriptive Statistics of Our Vwap Inputs

On Portfolio Formation

We measure momentum as the cumulative return over flexible 3-, 6-, 9-, and 12-month lookback periods (pre-event historical windows), skipping the most recent months to avoid microstructure noise and capturing emerging trends without a rigid prior. Portfolios are formed on an event-triggered basis, rather than on a fixed-term rebalancing schedule, to align with the episodic nature of regulatory shocks and real-time market dislocations.

To operationalise dynamic timing, we concentrate on post-event dislocation harvesting: following a regulatory announcement, immediate market responses are monitored over a 3, 6, 9-month window to compute pairwise return correlations among the top 50 VWAP stocks. This reduces the risk of long historical reliance and overlapping issues, handling look-ahead bias and enhancing forward-looking practicality.

We construct a distance matrix, denoted as D where:

$$D_{ij} = 1 - \rho_{ij} \quad (1)$$

(1) stands for the minimum spanning tree to identify negatively impacted clusters during tightening phases. Comparatively, we use the similarity matrix, denoted as S where:

$$S_{ij} = 1 + \max(\rho_{ij}, 0) \quad (2)$$

(2) stands for the maximum spanning tree to pinpoint amplified groups during easing phases, with ρ_{ij} denoting the Pearson correlation coefficient between the returns of stocks i and j , formalised as:

$$\rho_{ij} = \frac{\text{cov}(r_i, r_j)}{\sigma(r_i)\sigma(r_j)} \quad (3)$$

In (3), r_i and r_j are the return series, cov is the covariance, and σ is the standard deviation.

On Portfolio Construction

We apply Kruskal's algorithm under Network via the expression of *nx.minimum_spanning_tree(G)* or *nx.maximum_spanning_tree(G)* where we use *nx* to denote the NetworkX package in Python. Our fundamental purpose is to yield a tree (T) that minimises or maximises the total edge weight given by $\sum_{(u,v) \in T} w(u,v)$, ensuring (T) spans all vertices [21,22]. Then, clusters are extracted via optimised community detection through component scoring with the help of the Louvain method [23,24]. Dense clusters will signal 'risk on' regimes for momentum amplification; fragmented ones will indicate 'risk off' states for de-risking.

We hypothesise that spanning trees methods will facilitate the formation of fragmented clusters, enabling short-term reversals and then re-clustering for long momentum; meanwhile, persistent fragmentation may limit recovery, favouring short positions. We will use point-in-time settings to ensure computations use only contemporaneous data, with ex-post dislocation measurement via cluster scores given by:

$$Q = \frac{1}{2m} \sum_{i,j} \left[A_{ij} - \frac{k_i k_j}{2m} \right] \delta(c_i, c_j) \quad (4)$$

In (4), A_{ij} denotes the adjacency matrix entry (1 if connected, 0 otherwise), $k_i = \sum_j A_{ij}$ the degree of node (i), $k_j = \sum_i A_{ij}$ the degree of node (j), $m = (1/2) * \sum_{i,j} A_{ij}$ the total edges, and $\delta(C_i, C_j) = 1$ if node (i) and node (j) share community (c), else 0.

We can infer that elevated (Q) post-easing indicates cohesive 'risk-on' momentum clusters, while depressed (Q) post-tightening signals de-risking opportunities. From this perspective, momentum testing constructs long-short portfolios within clusters: long the top one-third of winners (short the bottom one-third of losers) during easing for persistence; de-risk or short an equal proportion of winners (long losers) during tightening for reversals. Then, we demonstrate the potential of our work across shocks on a preselected set of events (Table 2).

On Robustness

Robustness check is a two-fold process. First, we will benchmark our portfolio against a naïve time series momentum that trades 2-period and 4-period window moving average crossovers on monthly data. Second, we consider a hypothetical 1 basis point transaction cost per trade, simulated via adjusted returns

$$r_a = r - t_x \times |\Delta w| \quad (5)$$

In (5), r_a is the net-of-fees return, r is the gross return, t_x is the transaction cost per trade, and Δw is the absolute change of the portfolio weight (assume 50% turnover rate for portfolio rebalancing). The baseline assumption is 1 basis point per trade for stylisation purposes. To assess robustness, we stress test transaction costs across a range from 1 to 100 basis points. The stress test has two purposes: firstly, to determine whether our strategy remains profitable under moderate cost assumptions; secondly, to identify the cost threshold (set by the said 1 basis point) at which the strategy breaks even.

The sensitivity analysis also has a two-fold parallel structure: first, we calculate average return series across all event-window-lookback combinations; then, we apply transaction costs from 1 to 100 basis points in 5-basis-point increments, formalising by computing annualised P&L for each cost level. Furthermore, we extend the robustness check with learning from bootstrapping to validate the reliability of our tree method specifications by calculating confidence intervals on modularity scores and average edge weights to confirm the validity of our approach [25]. The method rephrases the main focus of our work. During unique shocks, a dynamic process is most effective in capitalising on market dislocations caused by regulatory shocks in Chinese A-shares.

Event	Date	Type	Description
QFII Expansions [26]	January 2013	easing	Boosted foreign inflows and liquidity access
Shanghai-Hong Kong Stock Connect Launch [27]	November 2014	easing	Enhanced cross-border flows and market integration, favouring long momentum
Registration-Based IPO Implementation [28]	February 2023	easing	Lowered listing barriers and improved capital allocation, particularly for technology firms, favouring long momentum

Anti-Corruption Drive (China Daily, 2012)	November 2012	tightening	Targeted luxury consumption behaviour, enabling short-term reversals, with potential easing re-clustering for long momentum
Stock Market Crash Interventions [29]	July 2015	tightening	Imposed trading halts and short-selling bans, expected to create fragmented clusters due to heightened volatility and reduced liquidity, favouring short positions amid prolonged dislocation
After-school Tutoring Ban [30]	July 2021	tightening	Directly restricted for-profit education models; We expect to induce persistent fragmentation in thematic clusters, limiting recovery and favouring extended short positions due to structural impairment
Source: Author.			

Table 2: Presents a Series of Regulatory Events Used by Us

Empirical Results

Easing Events

QFII Expansions (January 2013)

The QFII Expansions mark a structural opening of China's capital markets to foreign institutional investors, which theoretically improves liquidity and price discovery. Our analysis reveals a nuanced detail: while the naïve momentum strategy suffered significant losses (-28.5 percent after fees), our network-conditioned approach mitigated losses (-4.3 percent after fees). This divergence is instructive; it indicates that the naïve strategy's reliance on simple moving average crossovers failed to capture the heterogeneous effects of foreign inflows across equity clusters.

The QFII result questions the common belief that easing events always benefit momentum strategies through 'liberalisation'. The negative returns of our approach, despite outperforming the naïve directional benchmark, indicate that event-triggered market regime changes can disrupt traditional momentum patterns. This is often referred to as a momentum 'crash' by practitioners. The maximum spanning tree identified clusters with positive correlations (average edge weight confidence interval within [1.86, 1.99]). However, the modularity score (Q score confidence interval [0.04, 0.73]) indicates less cohesive clusters, which may have limited the strategy's ability to identify 'pure' momentum pockets. This aligns with existing research on economic policy uncertainty, which dampens momentum by reducing trend persistence; our findings extend this by demonstrating that perceived positive policy shocks can create uncertainty that fragments classic momentum signals.

Shanghai-Hong Kong Stock Connect Launch (November 2014)

The Stock Connect Launch marks a significant integration effort that boosted cross-border capital flows. Our strategy delivered positive returns (8.0 percent after fees), but it underperformed the naïve momentum benchmark (22.1 percent after fees). This underperformance derives from two interconnected factors. First, the naïve strategy's directional moving average crossovers captured the broad market rally caused by the Connect Launch. At the same time, our cluster-based method might have over-segmented the market, leading us to overlook the broader upward trend. Second, the relatively high modularity scores (Q score confidence interval [0.31, 0.73]) indicate that the maximum spanning tree's focus on the strongest positive links may have unintentionally grouped stocks with autocorrelation noise, rather than genuine momentum persistence. This aligns with the methodological critique concerning the sensitivity of correlation-based networks to the choice of estimation windows.

Registration-Based IPO Implementation (February 2023)

The Registration-Based IPO reform shifted to market-oriented capital allocation, lowered listing barriers, and aimed to improve price discovery. The IPO reform created heterogeneous impacts across sectors; technology and growth stocks benefited disproportionately from easier capital access, while traditional sectors saw limited impact. Our strategy achieved a moderate performance with a 3.8 percent return after fees, compared to the naïve benchmark, which had negative returns of -2.4 percent after fees. Interestingly, the modularity scores (with an average Q score of 0.72 and a confidence interval of [0.44, 0.73]) align well with existing research on the said topic of estimation window sensitivity in correlation-based methods. The maximum spanning tree seems capable of identifying growth-linked clusters, enabling the strategy to leverage momentum within the affected group. Nevertheless, we believe it is more prudent to remain sceptical about the stability of our tree methods so far; the outperformance of our momentum strategy, especially considering the wide confidence interval, justifies caution.

Tightening Events

Anti-Corruption Drive (November 2012)

The Anti-Corruption Drive initiated in November 2012 represents a gradual tightening episode targeting luxury consumption and government-linked sectors. We argue this will lead to predictable distress in affected equity clusters. Our strategy delivered modest positive returns of 0.9 percent after fees, outperforming the naïve directional benchmark, which registered losses of 10.0 percent after fees. This divergence in performance merits careful interpretation, as it suggests that the minimum spanning tree's identification of correlation-based clusters can provide defensive positioning

during sector-specific regulatory interventions .

However, some findings raise doubts about this outcome. First, the magnitude of outperformance, while favourable in the context of benchmarking, is modest, raising questions about the practicality of the strategy to survive live execution. Second, the high modularity scores are observed across all window specifications (average Q score is 0.80). At the same time, the confidence interval [0.76, 0.80] suggests strong cluster cohesion, yet this cohesion fails to translate into strong returns in commensuration. This counterintuitive disconnection (notwithstanding that it is entirely possible to see the combination of wider confidence interval and stronger strategy performance) between network structure and economic outcome warrants reflection on whether the correlation-based distance metric captures the directional signals necessary for profitable reversal strategies.

The methodological limitation becomes evident when considering the nature of the Anti-Corruption Drive as a gradual rather than an acute tightening episode. Unlike crisis interventions that generate sharp correlation spikes, this episode unfolded over an extended period, which may have led to a shift in the correlation structure before our post-event measurement window captured the full effect. The minimum spanning tree's distance metric might have been too broad to distinguish between defensive clusters and those temporarily detached from the wider market. This observation aligns with prior research indicating that central nodes in minimum spanning trees serve as transmission hubs during volatility spikes. Our findings extend this understanding by suggesting that during tightening phases, these transmission dynamics may become more dispersed and harder to detect properly with linear dependency metrics alone.

Stock Market Crash Interventions (July 2015)

The 2015 Stock Market Crash Interventions represent an acute tightening episode characterised by trading halts, short-selling bans, and direct government purchases, testing the boundary conditions of our work. Contrary to the theoretical expectation that extreme correlation convergence would undermine the clustering mechanism, our empirical results show that the strategy generated positive returns of 25.7 percent after fees, outperforming the naïve momentum benchmark, which achieved 6.6 percent after fees. This outcome may be the strongest validation of the network-conditioned approach across all six regulatory events studied.

Interestingly, the strong relative performance during this time also challenges the usual thinking about how tree methods respond to sudden correlation increases during crises. It appears that, during the panic sale in this context, the distance metric of the minimum spanning tree maintained adequate differentiation to identify clusters of stocks that exhibited heterogeneous responses to government intervention. The naïve momentum benchmark, which employs simple moving average crossovers, captured the broad market rebound but failed to exploit the sectoral dispersion that the network approach successfully isolated. This finding suggests that well-specified network-based clustering can exploit asymmetries during periods of moderate stress. It will be of particular interest to observe whether extreme fat-tailed crises result in structures that completely undermine the correlation-based clustering mechanism.

The temporal specificity of the results thus far warrants attention . Examining our specification more closely, the correlation window for network building concludes the day prior to the event date. This guarantees that all network construction choices are made solely based on data observable before the event. This point-in-time implementation handles ambiguity about look-ahead bias and makes the intended real-time application more transparent. Nevertheless, the practical challenge remains that during extreme crisis periods, the very foundation of the network approach, the assumption that meaningful cluster structures exist in the correlation matrix, may be violated and needs time to settle down between the risk 'on' and 'off' state, provided the shock creates sufficient heterogeneity in sectoral responses.

After-School Tutoring Ban (July 2021)

The After-school Tutoring Ban represents a structural tightening event that permanently impaired the for-profit education sector, offering validation of our work's potential to identify and exploit persistent fragmentation within thematic clusters for said risk 'on' and 'off' regime switch. Our strategy generated strong positive returns of 9.7 percent after fees, outperforming the naïve benchmark, which registered losses of 5.2 percent. This result is informative to us because it represents a permanent shock rather than a temporary crisis, allowing the network structure to stabilise around the new regulatory reality.

The identification of clusters based on minimum spanning trees facilitated the strategy to short-sell related stocks while preserving defensive positions in unaffected sectors. The subpar performance of the naïve momentum strategy can be attributed to its inability to distinguish between short-term volatility and long-term structural issues. It uniformly applies the same directional signals to all stocks without accounting for sector-specific differences. The trend of modularity scores across all-window specifications in this case shows that, after the initial cluster stabilisation, it successfully detects meaningful structures that persist throughout the post-event window.

Takeaway Conclusion

In summary, the network-conditioned approach appears most effective when regulatory shocks lead to lasting structural changes that allow cluster relationships to stabilise. This method is less suitable during abrupt crises when correlation structures are in flux. If the naïve momentum benchmark underperforms, it may signal its inability to distinguish between

near-term volatility and deeper, long-term structural problems. On the other hand, the network-based approach helps us understand the primary theme of the regulatory shock and positions the portfolio accordingly within the context. This finding shows that factor timing relies on regime-identifying events; it may be somewhat circular, but the main idea of our work is that we need a process to develop a thorough understanding of this in the A-shares market, and in practice, we must be ready to modify the process when market regimes shift.

Robustness

A key practical aspect of any trading strategy is how transaction costs affect overall performance, especially for strategies that require regular rebalancing and high turnover. This section presents the robustness analysis, exploring how results respond to different transaction cost assumptions and assessing the stability of the network construction methods via bootstrap resampling.

Transaction Cost Sensitivity

The baseline transaction cost assumption of 1 basis point (0.01 percent) per trade represents a stylised and optimistic scenario intended for illustration rather than a realistic estimate of institutional execution costs in the Chinese A-shares market. This assumption encompasses broker commissions and market impact but excludes statutory compliance costs, such as stamp duty. The purpose of this optimistic baseline is to establish an upper bound on strategy viability, asking whether the approach can remain profitable even under favourable cost assumptions before introducing more realistic frictions.

To evaluate the robustness of this assumption, we perform a sensitivity analysis by increasing transaction costs from 1 to 100 basis points in 5 basis point steps. The findings show that our network-driven momentum strategy stays profitable throughout all tested cost scenarios, with the break-even point appearing beyond the highest tested cost of 100 basis points. In contrast, the naïve momentum benchmark remains consistently unprofitable at all cost levels and worsens as costs rise.

The assumption of a 50 percent turnover rate used in the baseline calculation might underestimate rebalancing activity during periods of rapid cluster formation and dissolution. Future research should include dynamic turnover estimates based on realised cluster stability metrics, although such analysis is beyond the scope of this study. Moreover, the assumption that per-unit pricing scales linearly may not hold for larger position sizes, where market impact becomes nonlinear, and minimum commission thresholds cause discrete cost jumps that the continuous model cannot account for, leading to 'over-trading' and increased execution costs.

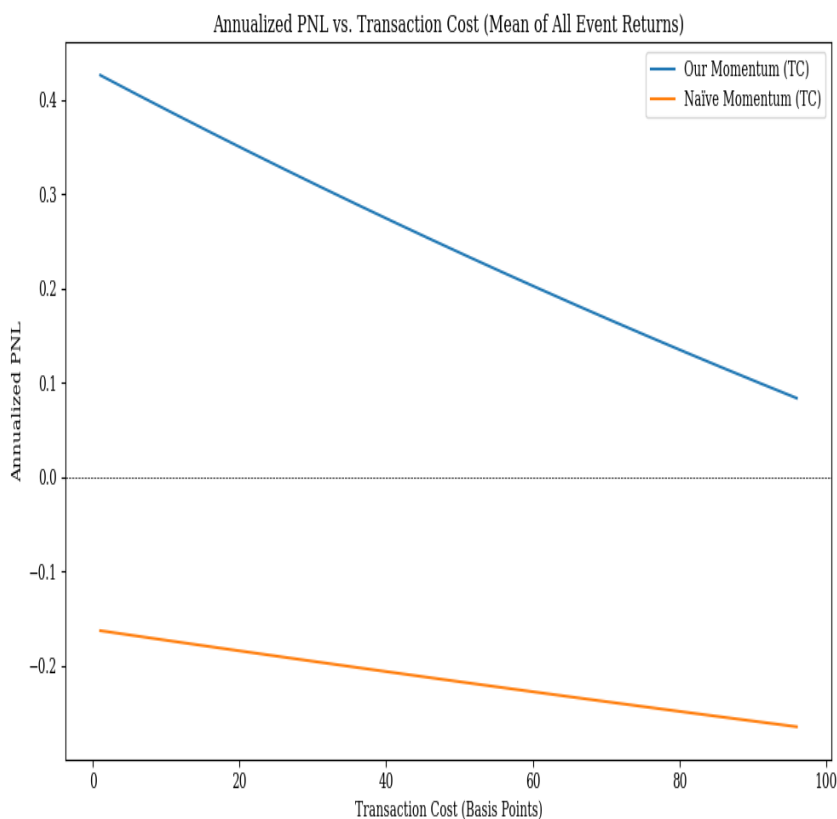


Figure 1

Note: Figure 1 line plot shows the annualised P&L against transaction costs (in basis points) for both our momentum strategy and the naïve benchmark. The analysis reveals the linear relationship between transaction costs and net performance, illustrating the point at which each strategy breaks even.

Bootstrap Validation

To verify the reliability of the spanning tree construction, a bootstrap resampling procedure is executed, drawing 1000 samples with replacement from the pre-event return series. For each resample, the correlation matrix is reconstructed, the appropriate spanning tree (minimum for tightening events, maximum for easing events) is built, clusters are detected, and modularity scores and average edge weights are calculated. This process produces confidence intervals that mitigate concerns regarding the sensitivity of minimum spanning tree methods to estimation noise and small-sample biases.

The bootstrap results offer statistical validation for the robustness of the cluster detection method. The 95 percent confidence interval for the modularity score Q ranges from 0.751 to 0.822. The comparatively narrow confidence band, approximately 0.07 in width, signifies that the community detection outcomes are unlikely to be artefacts of sampling variability. This evidence addresses certain methodological inquiries in the literature related to the stability of network hierarchies concerning estimation windows, implying that the cluster structures identified in our analysis may possess a certain level of substantive statistical validity.

By comparison, the average edge weight exhibits more variability, with a 95 percent confidence interval ranging from 0.075 to 0.200. This wider spread reflects the heterogeneous nature of correlation strengths across event types and our window specifications. Interpreting edge weights requires careful contextualisation: the values represent the average customised correlation across the edges in the spanning tree, not the raw correlation coefficients themselves. When converted back to the correlation space, these values suggest moderate positive correlations in the underlying return series, aligning with the general observation that equity returns tend to exhibit positive dependence during both normal and crisis periods.

The distinction between the stability of modularity scores and the variability of edge weights bears nuanced implications for strategy implementation. The consistent cluster structures signified by stable modularity scores indicate that the community detection component of our tree method is reliable on the aggregate. In contrast, the variability observed in edge weights indicates that the precise strength of relationships within clusters may be estimated with reduced accuracy. This observation is further supported by empirical results on an event-to-event basis. Such asymmetry implies that, in practical applications, it may be more prudent to prioritise cluster membership in portfolio construction rather than attempting to exploit fine-grained correlation differences for position sizing.

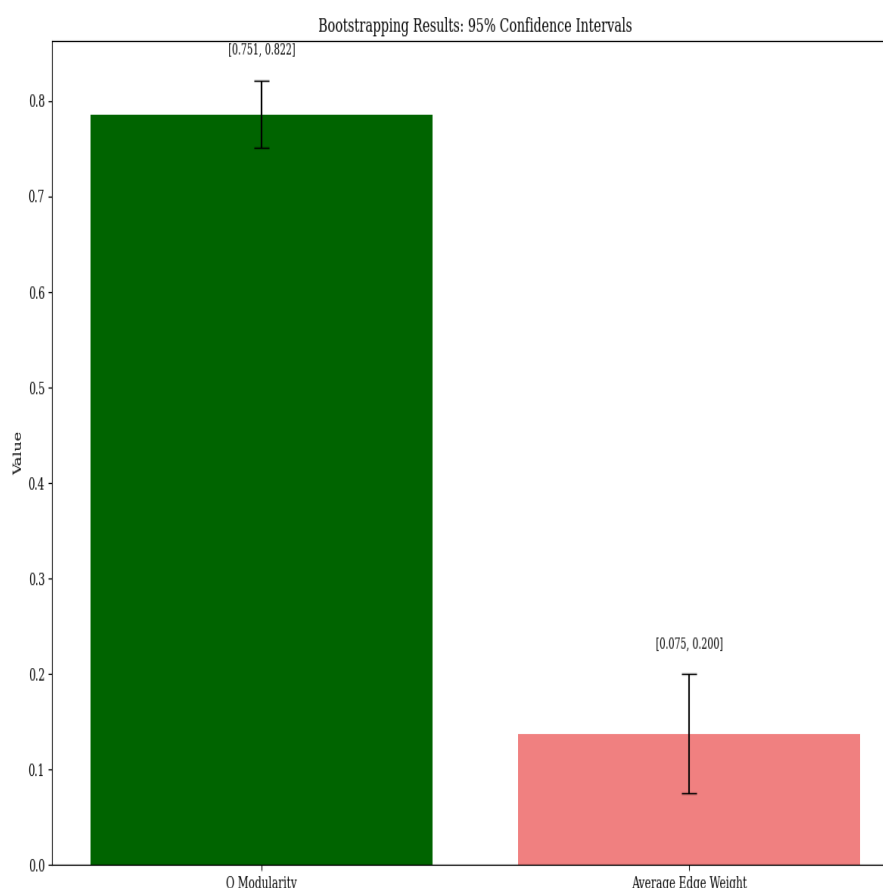


Figure 2

Note: Figure 2 presents a bar plot illustrating the 95% confidence intervals for two key network metrics: Q Modularity and Average Edge Weight. The visualisation employs bar charts with error bars to depict the uncertainty bounds obtained through 1000 bootstrap resamples of the correlation matrices.

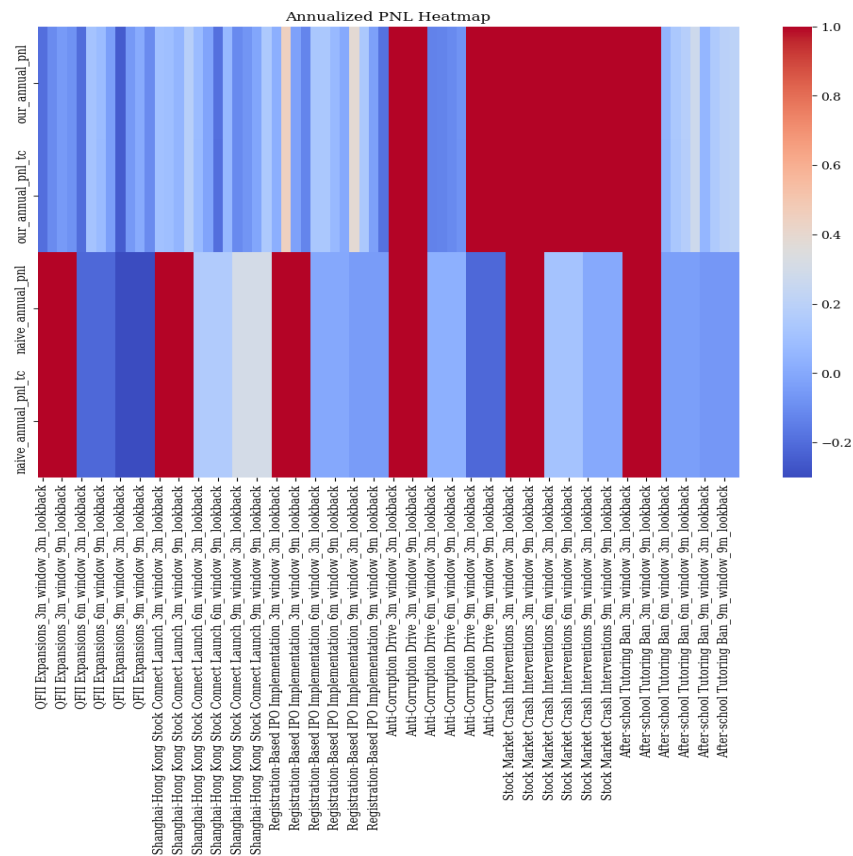


Figure 3

Note: Figure 3 presents a heatmap visualising annualised P&L across all strategy variants and all event-window-lookback combinations, represented through various shades of blue and red (the closer to blue, the higher the loss; the closer to red, the higher the profit), with missing ('na') values filled with 1, visualised using the darkest red colour.

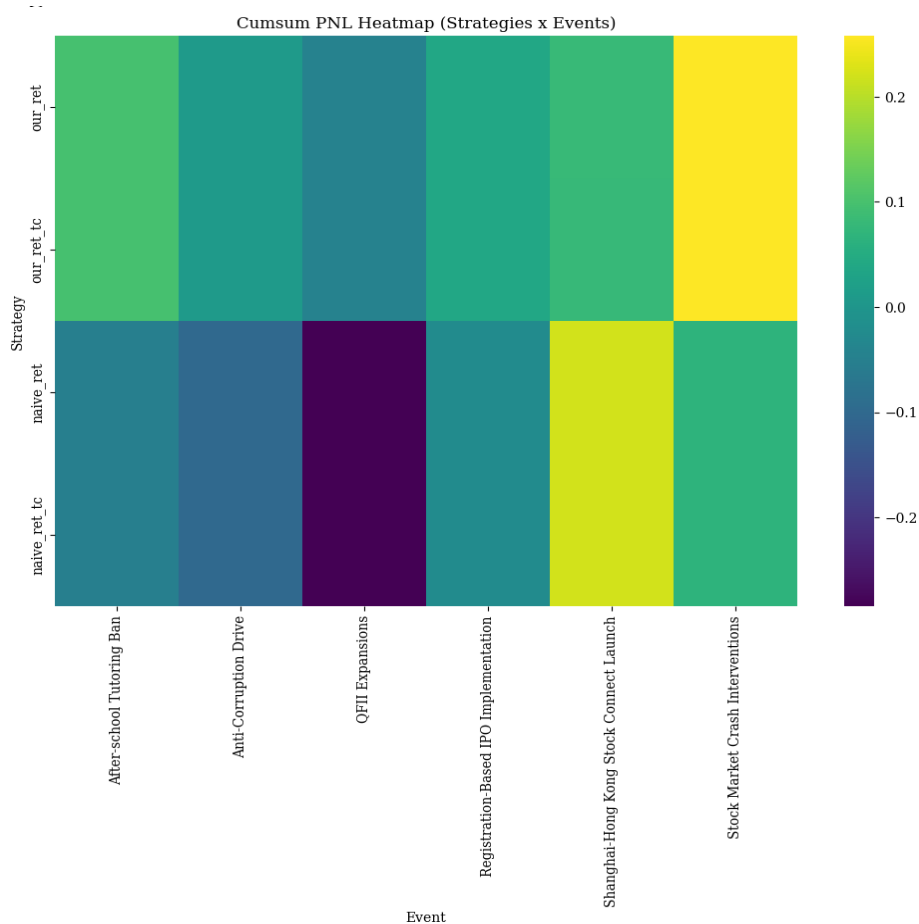


Figure 4

Note: Figure 4 presents a heatmap that visualises the performance of four strategy variants across six regulatory events, offering a comprehensive overview of policy-conditioned momentum efficacy. The heatmap utilises a viridis colour scale, whereby warmer hues (yellow) signify positive cumulative returns, while cooler hues (dark purple) denote negative cumulative returns. The colour yellow (1.0) indicates that no signal was detected ('na' values filled for visualisation).

Event (Alphabetical Order)	Our_ret	our_ret_tc	naïve_ret	naïve_ret_tc
After-school Tutoring Ban	9.8%	9.7%	-5.2%	-5.2%
Anti-Corruption Drive	1.0%	0.9%	-10.0%	-10.0%
QFII Expansions	-4.3%	-4.4%	-28.4%	-28.5%
Registration-Based IPO Implementation	3.8%	3.8%	-2.4%	-2.5%
Shanghai-Hong Kong Stock Connect Launch	8.0%	8.0%	22.1%	22.1%
Stock Market Crash Interventions	25.8%	25.7%	6.6%	6.6%
Source: Author.				

Table 3: Presents The Precise Magnitude Of P&L Across Four Strategies

Review of Policy-Conditioned Momentum Performance

Our research posits that regulatory shocks function as regime-switching mechanisms capable of modifying the effectiveness of momentum strategies within Chinese A-shares. Contrary to the prevailing assumption that momentum is inherently weak or absent in China's retail-dominated market, our findings reveal that momentum exhibits a conditional nature: it emerges during periods of policy easing and diminishes or reverses during tightening measures. This conditional manifestation questions the behavioural explanation that links weak momentum only to investor irrationality or market immaturity, instead highlighting the regulatory cycle as a non-negligible propagation mechanism driving momentum persistence in the context of Chinese A-shares.

The cumulative P&L heatmap (Figure 4) reveals asymmetric performance patterns consistent with our theoretical expectations. Firstly, during each tightening episode, our network-conditioned momentum strategy shows positive cumulative returns. Notably, Stock Market Crash Interventions achieved a relative outperformance of approximately 19 percent compared to our directional benchmark. Secondly, in easing episodes, our long-short strategy also reveals notable potential. We mitigate relative P&L losses in QFII Expansions by about 24 percent compared to the directional benchmark. These empirical findings support the viability of our approach for factor timing within the context of policy-driven momentum harvesting.

Reflections on Factor Timing in Policy-Dislocated Markets

The empirical results presented earlier coalesce around several observations that could inform the considerations of practitioners regarding factor timing in policy-sensitive markets. These reflections are offered with appropriate caveats concerning the limitations of the analysis, including the limited sample size of six events and the ex-post nature of event selection. The following observations should be regarded as stylised facts derived from detailed case study analysis rather than as definitively statistically verified principles applicable universally to all regulatory regimes.

The Conditional Nature of Momentum Manifestation

The conventional understanding that momentum is weak or absent in Chinese A-shares reflects what may be considered an aggregation fallacy, wherein the combination of heterogeneous dynamics across different market regimes obscures the presence of momentum effects within specific policy-conditioned clusters. Our results show that the momentum anomaly can be observed within identifiable equity groupings during both easing and tightening phases, although its manifestation varies significantly across regime types. During easing phases, maximum spanning trees identify growth-linked groups with persistent trends suitable for long momentum strategies. In contrast, during tightening phases, minimum spanning trees isolate distressed clusters where reversal patterns tend to emerge.

However, this observation must be qualified by recognising that the weakness of the aggregate momentum factor is not just a statistical artefact but also reflects real challenges in implementing momentum strategies without conditioning on regime identification. The practical implication is not that momentum is always present and easily exploitable, but rather that its presence is contingent on correctly identifying the regulatory regime and choosing the appropriate network construction method for that regime. Our work's episodic nature, activating only during pre-identified regulatory shocks, represents an attempt to address this contingency. However, the practical challenge of real-time shock detection remains a significant implementation hurdle.

Network Structure

The modularity score offers a quantitative perspective for evaluating the potential viability of network-conditioned momentum strategies. High Q scores, surpassing 0.75, signify cohesive cluster structures that could enhance momentum signals, whereas moderate Q scores between 0.70 and 0.74 imply more fragmented configurations where the momentum persistence may be diminished. The scatter plot (Figure 5) illustrating modularity scores in relation to annualised P&L

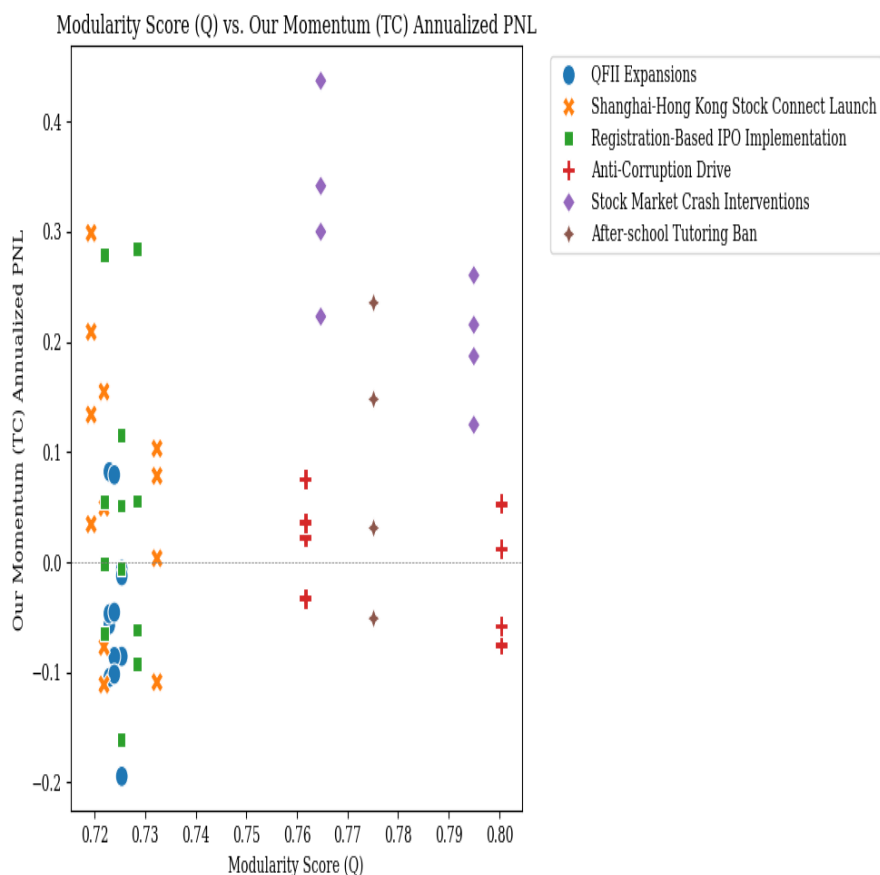
demonstrates a positive yet noisy relationship, with some variability in performance at comparable Q score levels. This observation aligns with expectations.

This observation suggests that while network cohesion is a necessary condition for strategy effectiveness, it is not sufficient. Other factors, including the magnitude and duration of the regulatory shock, the sectoral concentration of affected stocks, and the broader market environment (in which that directional benchmark may excel), all influence realised performance. The relationship between Q scores and P&L also shows event-specific clustering. We note that the Stock Market Crash Interventions display both high Q scores and strong relative returns; however, the Anti-Corruption Drive exhibits similarly high Q scores but more modest performance. This heterogeneity warns against using modularity scores as the sole criterion for strategy deployment.

Episodic Timing Versus Continuous Exposure

The performance gap between event-triggered and directional momentum strategies observed in our analysis offers a vital perspective into the broader issue of factor timing. Our momentum method shows the potential to enhance relative performance by avoiding the so-called 'choppy tape' periods that diminish factor gains. However, this advantage comes at the expense of prolonged periods of capital inactivity between events, which might be unacceptable for industry mandates that demand continuous market exposure. The comparison with the naïve momentum benchmark, which employs constant directional exposure through moving average crossovers, highlights the trade-off between signal quality and active market engagement. It outperforms our network-conditioned approach by capturing broad market rallies, whereas the cluster-based method may become entangled in a one-sided noise-to-signal ratio. This suggests that an ensemble approach, combining network-conditioned positioning during identified shock periods with broader market exposure during normal times, could be worth exploring further.

The caveat to all these observations is that they are based on a limited sample of six regulatory events from 2010 to 2025. While we include two distinct policy types (easing and tightening), the small sample size limits proper statistical inference. It raises the possibility that the observed patterns reflect idiosyncrasies of these specific episodes rather than generalisable principles. We emphasise that the results function more as detailed stylised facts derived from case study analysis than as statistical evidence of a recurring anomaly, and practitioners should approach implementation with appropriate scepticism and robust risk management protocols.



Limitations and Discussions

This paper has explored the hypothesis that regulatory cycles function as regime-switching mechanisms that conditionally drive momentum in Chinese A-shares, with network-based clustering providing a method to identify tradable momentum pockets during market dislocations. The empirical analysis of six major regulatory events from 2010 to 2025 offers some support for this hypothesis while also highlighting key boundary conditions and limitations that restrict the practical application of our findings.

The main finding is that momentum in Chinese A-shares is not inherently weak or absent, as traditional views suggest, but rather depends on specific conditions within policy-influenced equity clusters. During easing periods, maximum spanning trees identify growth-linked groups where trend persistence can be leveraged through long momentum strategies. During tightening periods, minimum spanning trees highlight distressed clusters where reversal patterns appear, allowing for short positions or defensive reallocations. This conditional appearance challenges behavioural explanations that attribute weak momentum solely to investor irrationality or market immaturity, instead presenting regulatory cycles as key drivers of momentum persistence in the Chinese market. Nonetheless, this finding should be viewed with awareness of the limitations.

First, a sample size of six regulatory events limits statistical inference and raises valid concerns about the generalisability of the results. The framework's effectiveness during the specific episodes studied may not extend to future regulatory shocks, especially given the changing nature of Chinese capital markets and the potential for policy innovation that can lead to unprecedented market dynamics. The findings serve more as detailed, stylised facts from case study analysis rather than statistical evidence of a recurring anomaly, and this distinction should influence how our work is interpreted.

Second, the event selection relies on ex-post identification of significant regulatory shocks, which introduces a form of look-ahead bias that the point-in-time implementation cannot fully eliminate. Although the correlation windows are constructed using only pre-event observable data and P&L is realised solely from post-event returns, the practical challenge of detecting shocks in real time remains significant. Transitioning from ex-post demonstration to ex-ante implementation necessitates further research into early-warning indicators for regulatory regime shifts, possibly involving natural language processing of policy documents or market-based measures of policy uncertainty.

Third, relying on Pearson correlations assumes linear relationships and Gaussian return distributions, both of which are often violated during extreme market conditions. Future work could include rank correlation methods to capture nonlinear dependencies better. However, this added complexity would reduce the directional and visual interpretability that makes spanning tree approaches appealing.

Fourth, focusing on the top 50 stocks by volume-weighted average price emphasises liquidity and the ease of execution, but might overlook momentum patterns in small-cap stocks where regulatory shocks can have more significant effects. The trade-off between liquidity and signal strength deserves further examination, especially for practitioners with mandates allowing less-liquid holdings. The customised VWAP measure provides an industry-like approach to liquidity-based stock selection, but alternative approaches could result in different universe compositions and thus, varied strategy outcomes.

Fifth, the transaction cost analysis, while demonstrating robustness to the stylised one basis point assumption through sensitivity testing, does not fully capture the complexity of institutional execution in Chinese markets. The exclusion of stamp duty, the assumption of linear cost scaling, and the constant turnover assumption all represent simplifications that may understate true implementation costs. Practitioners should conduct their own cost analysis based on specific execution capabilities and mandate constraints before deploying similar strategies.

Finally, and perhaps most importantly, this work is presented as an experimental case study for developing a dynamic process for policy-conditioned momentum harvesting rather than as a ready-to-use alpha system. We do not assert to have solved the inherent unpredictability of financial markets, nor do we claim that our work is universally applicable across all market conditions. Instead, the contribution lies in demonstrating the potential of network-based approaches for factor timing in policy-sensitive markets, while openly recognising the boundary conditions and limitations that restrict practical implementation.

Looking ahead, several directions for future research arise from our work. The integration of text mining methods for real-time policy shock detection could help address the ex-post selection limitation. Incorporating alternative correlation measures and rank-based dependency modelling could improve robustness during extreme market conditions. Expanding to larger stock universes and exploring cross-asset applications could broaden the applicability of our work. Most importantly, accumulating additional regulatory event data over time will enable more rigorous statistical testing of the methods proposed in this paper.

In summary, although our empirical results offer intriguing evidence for the conditional manifestation of momentum in Chinese A-shares and the potential of network-based clustering to identify tradable dislocations, the limitations discussed earlier advise caution against over-interpretation. Our work provides a new perspective on an ongoing puzzle,

suggesting that momentum's apparent weakness in China may stem from the aggregation of heterogeneous, regime-specific dynamics rather than an inherent absence of trend persistence. Whether this perspective leads to lasting alpha generation remains an open question that only practitioners can answer with more battle-tested market data.

Data Statement

The data used in our research is made available under the MIT license.

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