

## The Evolution of Core-Periphery Structure in China's Urban Network: A Securities Service Linkage Perspective (Postprint)

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**Date:** 2022-10-21T00:00:00+00:00

### Abstract

Research on core-periphery structures will deepen the understanding of urban network evolution patterns. Based on a securities service connections perspective, this study analyzes the evolutionary characteristics of the core-periphery structure of China's urban network and its influencing factors from 2005 to 2019. The results show that: (1) The scale of the core block of China's urban network has expanded steadily, while the distribution of urban coreness has become more dispersed, driving the urban network toward a polycentric pattern; the core block of the urban network is mainly composed of core cities of urban agglomerations, and the distribution of urban network connectivity converges to Zipf's law, indicating that China's urban network will exhibit persistent hierarchical structural characteristics. (2) Political power, market potential, knowledge capital, aviation connections, and economic openness determine the ability of securities firms to acquire valuable information flows, thereby constituting the foundation for the formation and development of the core-periphery structure of China's urban network; the network status of cities largely stems from their influence in "place space," which implies that the development of urban networks may exacerbate the development gap in China's urban economy.

### Full Text

## Core-Periphery Dynamics of the Urban Network in China: A Study Based on Securities Service Relationships

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## Abstract

Securitization has been a key aspect of China's financial development. Since the implementation of the Reform and Opening-up policy, China's securities industry has experienced rapid development. A large number of securities firms have grown over the past 40 years, and the distribution of the branches of these firms has expanded rapidly. In this context, securities service relationships provide important insights for the study of urban networks and are strengthening links between cities. This paper aims to analyze the core-periphery structure dynamics and as well as underlying factors of the urban network in China. First, data on headquarter and branch locations of securities firms in China is analyzed using the interlocking network model to approximate the urban network, resulting in a  $293 \times 293$  valued urban network. Then, using the information hinterland theory and two types of econometric models, the pooled logit and pooled probit models, the paper identifies factors underlying variations in the network status of cities. Finally, by combining the structural dynamics and underlying factors of the urban network in China, this paper proposes a preliminary core-periphery dynamic model for further discussion of the securities service relationships in the context of the urban network. Major findings include: (1) A developing core-periphery structure in China's urban network within securities service relationships. From 2005 to 2019, the size of the core block has expanded, and the distribution of cities' cores tends to be decentralized, which signals the emergence of a polycentric pattern in urban network structure. The spatial pattern of the core-periphery structure corresponds to current inequalities, and overall, cities located in the four major metropolises of Beijing-Tianjin area, Yangtze Delta area, Pearl Delta area and Chengdu-Chongqing area are better positioned than those in other regions. The core block consists primarily of core cities in China's major metropolitan areas. This is a departure from the core-periphery model in the "space of places." Connectivity distribution in cities has shown a trend consistent with Zipf's law, which outlined a lasting hierarchical structure in the urban network. (2) Information hinterlands are shown to decisively affect cities' network status within securities service relationships. On the one hand, the characteristics of a given city, including political rank, market potential, knowledge base, air travel accessibility and economic openness, determine whether securities firms might profitably exploit information flows. Therefore, these characteristics are key factors underlying the core-periphery dynamics in the urban network. On the other hand, information hinterland factors are regionally heterogeneous: political rank, knowledge base, transport accessibility and economic openness have greater marginal impacts on the status of cities in the central and western regions, while market potential plays a more prominent role in China's eastern regions. The results demonstrate that a given city's network status is rooted in its own influence or power in the "space of places." Network development would, therefore, not lead to a reduction of spatial economic inequality but rather, reinforce it.

**Keywords:** securities firms; interlocking network model; core-periphery struc-

ture; information hinterland

## 1 Data and Methods

### 1.1 Construction of the Urban Network

We employ Taylor's "interlocking network model" to define urban network relationships in China. The enterprise sample consists of 104 securities firms listed on the China Securities Regulatory Commission website. The city sample includes 293 prefecture-level cities in China, excluding three leagues and Sansha City. We collected two types of information: securities firm branch locations and the scale of securities firms in each city. Preliminary analysis reveals that the headquarters of these 104 securities firms are distributed across 31 cities, while their branches are widely distributed across 293 prefecture-level cities. [Figure 1: see original paper] illustrates the distribution of China's securities firm assets across cities in 2019, with Shanghai, Shenzhen, and Beijing being the most concentrated cities.

The specific method for constructing the urban network is as follows: First, we construct a  $293 \times 104$  matrix where the element  $v_{is}$  represents the service value of firm  $s$  in city  $i$ , indicating the importance of firm  $s$  in city  $i$ . The service value adopts a five-level scoring system: 5 represents the headquarters, 4 represents provincial branches, 3 represents municipal branches, 2 represents business departments, and 1 represents offices. If a city has no branches of a securities firm, the service value is 0. Next, we transform the enterprise relationship matrix into a city relationship matrix. On this basis, we calculate the connectivity between city  $i$  and city  $j$  using the formula:

$$C_{i-j} = \sum_s v_{is} \times v_{js}$$

where  $C_{i-j}$  is the connectivity between city  $i$  and city  $j$ ;  $s$  represents the enterprise; and  $v_{is}$  and  $v_{js}$  are the service values of enterprise  $s$  in city  $i$  and city  $j$ , respectively. Based on the establishment time of enterprises and branches, we obtain urban network matrices for six time periods: 2005, 2009, 2013, 2015, 2017, and 2019. This yields a panel dataset of urban networks with dimensions of  $293 \times 293$ , where the values represent the degree of association between urban nodes in the corresponding time period.

### 1.2 Identification of Core and Periphery Blocks

We use Borgatti and Everett's discrete model to identify the core-periphery structure of the urban network. The discrete model is based on binary matrices, so we use the average inter-city connectivity in 2005 as a threshold to dichotomize the network matrix. The basic idea of the discrete model is to find a binary pattern matrix that maximizes the correlation coefficient between the binary observation matrix and the pattern matrix. Equation (1) provides a

method for estimating the correlation between the observation matrix and the pattern matrix:

$$\rho = \sum_{i,j} a_{ij} \delta_{ij}$$

where  $\rho$  is the correlation coefficient between the observation matrix and the pattern matrix;  $a_{ij}$  indicates whether there is a connection between city  $i$  and city  $j$  in the observation matrix (if a connection exists,  $a_{ij} = 1$ ; otherwise,  $a_{ij} = 0$ );  $\delta_{ij}$  indicates whether there is a connection between city  $i$  and city  $j$  in the pattern matrix (if a connection exists,  $\delta_{ij} = 1$ ; otherwise,  $\delta_{ij} = 0$ ); and  $b_i$  ( $b_j$ ) represents the block (core or periphery) to which city  $i$  ( $j$ ) is assigned. When the correlation between the observed network structure and the ideal pattern matrix reaches its maximum (i.e., when the  $\rho$  value yields the highest z-score), the network status of cities can be identified, and the network structure can be divided into core and periphery components.

### 1.3 Measurement of Network Structure

To measure the closure degree of urban network functional blocks, we select the E-I index. Given the core and periphery blocks in the network, the E-I index is defined as the difference between the number of external and internal ties of block members divided by the total number of ties. The E-I index can be used to assess the closure degree of each block and also to evaluate the embeddedness of the entire network. The E-I index ranges from -1 to 1, where -1 indicates that all ties are internal to the block, and 1 indicates that all ties are external to the block. When a network exhibits a core-periphery structure, the overall network's E-I index is typically negative.

To assess whether a given E-I index value is significantly different from the expected value under random permutation, a permutation test is required. To measure the network power of urban nodes, we select two complementary indicators: network connectivity (NNC) and coreness. The former measures the scale of a city's connections, while the latter measures a city's centrality in the network. Network connectivity is calculated as  $NNC_i = \sum_j C_{i-j}$ , which is the sum of city-pair connections from city  $i$  to city  $j$  in the network. Coreness is calculated based on Borgatti and Everett's continuous core-periphery model, where the pattern matrix is defined as  $\delta_{ij} = c_i \times c_j$ , with  $c_i$  and  $c_j$  being non-negative vectors of each node's coreness. The range of coreness is 0 to 1, and a higher coreness value indicates greater power in the network.

To measure the distribution of urban network power, we select the Herfindahl-Hirschman Index (HHI) and Zipf's law. HHI is used to calculate the distribution of city coreness:

$$HHI = \sum_i s_i^2$$

where  $HHI$  is the Herfindahl-Hirschman Index, and  $s_i$  is the proportion of city  $i$ 's coreness in the urban network. The HHI ranges from 0 to 1. An increase in HHI indicates that the distribution of urban network power is becoming more concentrated, while a decrease indicates a more dispersed distribution. Zipf's law is used to measure the distribution of urban network connectivity:

$$\ln(NNC) = \ln(\alpha) - q \times \ln(rank) + u$$

where  $NNC$  is a city's network connectivity;  $\alpha$  is a constant;  $rank$  is the city's ranking in network connectivity;  $q$  is the Zipf index to be estimated; and  $u$  is the residual. If the index  $q$  is close to or equal to 1, the distribution of urban network connectivity follows Zipf's law. When  $q > 1$ , the distribution is concentrated in the upper tail, indicating insufficient influence of small and medium-sized cities. When  $q < 1$ , the distribution is relatively balanced.

#### 1.4 Econometric Methods for Core-Periphery Structure Influencing Factors

In this paper, urban network status is a binary variable: core cities are coded as 1, and peripheral cities are coded as 0. Therefore, we employ pooled logit and pooled probit models to identify factors influencing the differentiation of urban core-periphery status. The former assumes a logistic cumulative distribution function, while the latter assumes a standard normal cumulative distribution function. The expressions for the pooled logit and pooled probit models are respectively:

$$P(y_{it} = 1|x_{it}) = \frac{1}{1 + e^{-x_{it}'\beta}}$$

$$P(y_{it} = 1|x_{it}) = \int_{-\infty}^{x_{it}'\beta} \phi(t)dt$$

where the dependent variable  $y_{it}$  is binary, taking the value 1 when city  $i$  is in the core block in period  $t$  and 0 otherwise;  $x_{it}$  is the vector of explanatory variables for city  $i$  in period  $t$ ;  $\beta$  is the parameter to be estimated; and  $x'_{it}$  is the transpose of the explanatory variable vector.

Since cities in a network environment are interrelated, the standard errors obtained from conventional econometric methods are no longer valid. We employ nonparametric bootstrap to estimate the fitted coefficients and standard errors. The basic idea is to conduct random sampling with replacement of the dependent variable and all corresponding explanatory variables, perform pooled logit and pooled probit regressions on the bootstrap samples, and repeat this process 500 times to obtain the sampling distribution of the fitted coefficients and their standard errors. The standard errors from this sampling distribution are

then used for significance testing of the explanatory variables. This hypothesis test based on random sampling does not require the independence condition of observations, making the results suitable for econometric analysis in network environments.

## 2 Results

### 2.1 Core-Periphery Characteristics of Network Structure

**2.1.1 Deepening Core-Periphery Features in Network Structure** A prominent feature of China's urban network core-periphery structure is the continuous expansion of the core block's size (Table 1). The number of cities in the core block increased from 6 in 2005 to 58 in 2019. During this process, most cities' coreness has improved, and even some cities that were previously "isolated islands" have been integrated into securities service relationships. The analysis results further verify the evolution characteristics of China's urban network core-periphery structure (Table 2). The density of the core block has consistently remained greater than that of the periphery block (in 2005 and 2019, the densities were 0.310 vs. 0.002 and 0.175 vs. 0.004, respectively), indicating that the core block forms a tightly connected cohesive subgroup, while ties among periphery block members are relatively loose. The E-I index for the core block is positive, while that for the periphery block is negative, suggesting that the core block is the sender of ties and more likely to become the network center. Meanwhile, the overall network's E-I index has increased from -0.729 to -0.541, indicating that ties between the core and periphery blocks have strengthened, leading to the emergence of inter-group cohesion characteristics in China's urban network evolution.

**2.1.2 Decentralization of Urban Coreness Distribution** Along with the deepening development of securities service relationships, the concentration of urban coreness in China has declined over the past 15 years. On the one hand, the HHI of core block cities' coreness decreased from 0.203 in 2005 to 0.084 in 2019. The coreness of the primate city Shanghai in the network power system has significantly declined, while the coreness of 75% of cities in the core block has increased (Table 3). The analysis results align with the polycentric development model found in regional research, indicating that the distribution of urban network power is shifting toward a functional polycentric pattern. On the other hand, the skewness and kurtosis of coreness for the entire sample of cities have decreased from 2.013 and 5.063 in 2005 to 1.234 and 1.816 in 2019, respectively, indicating the decentralization of urban network power.

These findings echo Wójcik's research, which found that spatial disparities in the securities industry are much lower than in the banking industry. Overall, the distribution of urban coreness in China shows a trend toward decentralization.

**2.1.3 Spatial Pattern of Network Power Matches Traditional Economic Patterns** As shown in [Figure 2: see original paper], the spatial pattern of the urban network core-periphery structure aligns with the existing urban economic development pattern. Cities occupying core positions in the network are primarily core cities of regional urban agglomerations, such as Beijing and Tianjin in the Beijing-Tianjin-Hebei urban agglomeration; Jinan, Qingdao, and Yantai in the Shandong Peninsula urban agglomeration; Shanghai, Nanjing, Ningbo, and Nantong in the Yangtze River Delta urban agglomeration; and Shenzhen, Guangzhou, Zhuhai, and Zhongshan in the Pearl River Delta urban agglomeration. This concentration of economic linkages within a diamond-shaped region anchored by the four core areas of Beijing-Tianjin-Hebei, Yangtze River Delta, Pearl River Delta, and Chengdu-Chongqing regions demonstrates that urban network power is rooted in their influence in the “space of places.” However, it should be noted that the core block in the “space of flows” environment has transformed into cohesive subgroups or city archipelagos that are geographically dispersed but functionally closely connected, which differs from Friedmann’s concept of core regions being based on geographical proximity.

It is also worth noting that urban network linkages based on securities service relationships exhibit regional differentiation similar to the “Hu Huanyong Line,” which may imply that urban network development will not reduce economic development gaps between cities but may instead exacerbate economic inequality.

**2.1.4 Urban Connectivity Distribution Converges to Zipf’s Law** Despite the decentralization of urban network power, this trend has not altered the basic hierarchical characteristics of urban network status. The rank-connectivity distribution for the upper tail cities in 2005 and 2019 is shown in [Figure 3: see original paper]. In 2005, the distribution exhibited a “convex” shape with a q-index of 1.318, indicating that the connectivity of peripheral block cities was smaller than predicted by Zipf’s law. This “convex” shape implies that most cities’ connectivity was concentrated in the upper tail, with insufficient influence from small and medium-sized cities, suggesting a low degree of economic integration. By 2019, the distribution became approximately linear, and the q-index decreased to 1.096, indicating that during the process of economic integration, the number of core block cities expanded while the network status of peripheral block cities improved. Overall, the distribution of urban network connectivity exhibits hierarchical structural characteristics described by Zipf’s law. The analysis results align with Haberly et al.’s research on global financial network structures, which found that despite the “decentralization” trend driven by technological finance, the structure dominated by top financial centers has not fundamentally changed. Given that China’s securities market development is approaching saturation, the connectivity distribution may converge to Zipf’s law, implying that the urban network’s core-periphery structure will persist.

## 2.2 Factors Influencing Core-Periphery Structure

**2.2.1 Variable Selection** Porteous' s information hinterland theory provides a theoretical framework for understanding why financial activities tend to agglomerate in specific locations, emphasizing the importance of information flow accessibility in the development of financial centers. This accessibility may be influenced by inherent geographical location advantages but can also be altered by acquired urban attribute connections, such as political power, market potential, knowledge capital, transportation links, and environmental quality. On the one hand, securities firms typically hold large amounts of interest rate-sensitive assets. Macroeconomic conditions, fiscal policies, monetary policies, industry conditions, and corporate situations all affect expected cash flows and investors' required rates of return, thereby impacting securities firms' profits. This requires securities firms to be close to the sources of regulatory information. On the other hand, securities firms' main revenue sources include investment banking and brokerage businesses, which require maintaining close contact with issuing companies and institutional investors. This necessitates proximity to sources of market information. Therefore, spatial differences in regulatory information and market information constitute the objective basis for differentiation in urban network status.

Based on the above analytical framework and relevant research on information hinterland theory, we selected five categories of explanatory variables (Table 4) to test how urban attributes affect urban network power. (1) **Political power (Porank)** is measured using an ordinal variable to test how a city' s status in the national political system (accessibility to regulatory information) affects its network power. Beijing is coded as 1, other municipalities as 2, provincial capitals and sub-provincial cities as 3, and other cities as 4. (2) **Market potential (Value)** is measured by the total market capitalization of all A-share listed companies in a city to test whether cities with larger market potential, as indicated by new economic geography theory, are more likely to agglomerate securities service activities. (3) **Knowledge capital (Patent)** is measured by the cumulative number of patent applications per 10,000 residents to test how a city' s innovation capacity affects its power in securities service relationships. (4) **Location conditions (Airpas)** are measured by air passenger volume per 1,000 residents to analyze how location accessibility affects the differentiation of urban network power. (5) **Environmental quality (PM2.5)** is measured by annual average fine particulate matter concentration to test how urban living environments affect the agglomeration of high-end production factors and high-value segments of product value chains. (6) **Economic openness (FDI)** is measured by the logarithm of a city' s actual foreign direct investment to test how economic geographical position in international capital flows affects urban network power.

**2.2.2 Econometric Results Analysis** To avoid potential endogeneity issues, all time-varying explanatory variables are lagged by one period. Due to data

availability constraints, the city sample for the econometric analysis is reduced to 287. The regression results are shown in Table 5. The pooled logit model results are consistent with the pooled probit model, with five variables being statistically significant. The pseudo R-squared values range from 0.532 to 0.703, indicating that the information hinterland theory has high explanatory power for the development of securities service centers.

**Political power (Porank)** tends to improve a city' s network status. The main reason is that power centers are the sources of various types of regulatory information, located in the “heartland” of securities firms' information hinterlands. Additionally, compared with Western countries, China has numerous state-owned enterprises whose headquarters are also concentrated in power center cities, amplifying the attractiveness of these cities to securities firms. The research results align with Pan et al.' s conclusion that cities' hierarchical status in financial networks maps onto their status in the political hierarchy system to some extent. From the perspective of different regional samples, the impact of political power on network status is greater for cities in central and western regions than for those in eastern regions, implying that cities in central and western regions face greater information asymmetry constraints.

**Market potential (Value)** positively influences the probability of a city becoming a network core. Securities underwriting and wealth management are often non-standardized products with economies of scale, making it important for securities firms to be close to larger economic hinterlands and maintain good communication with clients. The analysis results align with new economic geography research findings, indicating that market potential still plays a significant role in the “space of flows” environment. From the perspective of different regional samples, the market potential variable has a greater marginal impact on the network status of cities in eastern regions, which may be related to agglomeration economies as eastern region cities concentrate a large number of A-share listed companies.

**Knowledge capital (Patent)** also has a significant positive impact on urban network status. The reason is that providing long-term financing support for innovative enterprises has become an important profit source for large securities firms: the higher a city' s innovation capacity, the more active the demand for corporate listing and direct financing, and the greater the attraction for securities firms' branch layout. From the perspective of different regional samples, the network status of cities in central and western regions is more sensitive to knowledge capital stock, mainly because innovation resources in these regions are scarcer and more spatially concentrated, leading securities firms to agglomerate in a few innovation-active urban areas.

**Air passenger volume (Airpas)** has a significantly positive coefficient in all equations, indicating that improved urban air connectivity increases the probability of a city becoming a core block member. The analysis results echo Laulajainen' s research conclusion that a city' s ability to collect information largely depends on its location conditions. From the perspective of regional

heterogeneity, the marginal effect of air passenger volume on cities in central and western regions is greater than on those in eastern regions, implying the relative scarcity and absolute concentration of valuable information in central and western regions.

**Environmental quality (PM2.5)** has a smaller impact on the differentiation of urban network status. Generally, cities with higher environmental quality can attract more high-quality labor and corporate headquarters and R&D institutions, thereby affecting cities' attractiveness to securities firms. The environmental quality coefficient is only significant in model 1 and not significant in pooled probit models, meaning that environmental quality improvement has not significantly increased the probability of cities becoming network cores. In fact, some cities with lower environmental quality such as Jinan, Tianjin, Nanjing, and Shanghai appear in the core block, while some central and western cities with better environmental quality such as Baotou, Zhaotong, Qiqihar, and Jiayuguan appear in the periphery block. This suggests that during China's urban economic transformation, environmental quality variables represented by PM2.5 are not sufficient to significantly affect securities firms' location choices.

**Foreign direct investment (FDI)** has significantly positive coefficients in all regression equations, indicating that cities with higher openness serve as gateways for foreign capital entering China, which attracts financial enterprises including securities firms. The analysis results align with Laulajainen's research conclusion that international capital played a key role in shaping financial centers in Australia and Canada. From the perspective of regional heterogeneity, foreign direct investment improves the network status of cities in central and western regions but has no significant impact on cities in eastern regions, once again indicating that regional development disparities in China have important potential impacts on urban network status.

### 3 Discussion

The research findings contribute to discussions on three issues. First, the core-periphery structure of urban networks in the "space of flows" environment deviates from the core-periphery model of regional economies in the "space of places." In the "space of places," the core consists of geographically proximate urban agglomerations, while the core in the "space of flows" refers to cohesive subgroups or city archipelagos that are geographically dispersed but functionally closely connected.

Second, this study confirms the applicability of information hinterland theory in explaining urban network power from the perspective of securities service relationships. Moreover, it further reveals the key impacts of political power, market potential, air connectivity, knowledge capital, and economic openness on the development of cities' information hinterlands, demonstrating that these factors constitute the basis for differentiation in urban network core-periphery structures.

Third, a city' s network status is largely rooted in its traditional attribute advantages. The analysis results align with Alderson and Beckfield' s conclusion that globalization-induced urban division of labor largely reproduces existing inequality patterns, rather than Sassen' s view that globalization is restructuring the power structure of world city systems. On this basis, we attempt to deduce a core-periphery evolution model for urban network spatial structure from the perspective of securities service relationships, which can be divided into four stages:

- 1) **Pre-network stage:** In this stage, the degree of asset securitization is very low, the number and scale of securities firms are small, and modern transportation and communication infrastructure is relatively weak. High transaction costs constrain the development of securities firm networks, leading securities firms to mainly operate in surrounding areas. Towns primarily exist as Christaller' s "central places," lacking economic linkages between them, with regional economies forming small-scale closed loops centered around several isolated towns.
- 2) **Initial core-periphery structure formation stage:** In this stage, significant reductions in transaction costs and rapid development of asset securitization promote cross-regional network layout of securities firms, and urban networks based on securities service relationships gradually emerge. The urban network initially forms a core-periphery spatial structure. A few cities with key resources and location advantages become agglomeration centers for securities firm headquarters and branches. These cities establish reciprocal linkages, forming cohesive subgroups located at the network' s core. Unlike Friedmann' s core-periphery model in the "space of places," the economic core in the network consists of geographically dispersed but functionally interconnected cities. Other cities attract some branches based on specific advantages, developing into peripheral nodes of the network. However, a large number of cities remain outside the network system in a closed development state.
- 3) **Rapid core-periphery structure development stage:** In this stage, with the rapid development of securities firm networks, the intensity and breadth of urban network linkages advance in depth, promoting the basic formation of a core-periphery structure at the national scale. China is currently in this stage, which may continue for some time. The notable feature of this stage is the significant increase in the number of core-status cities: many cities have substantially increased their service values and connectivity, squeezing into core positions in network power. The scale of cohesive subgroups expands rapidly, driving the urban network toward a functional polycentric spatial pattern. An increasing number of cities integrate into the network system by hosting branches, the number of peripheral-status cities increases substantially, and the number of isolated cities decreases significantly.
- 4) **Mature stage:** In this stage, the nationwide layout of securities firms is

basically complete, all cities establish linkages, forming a relatively complete national urban system, and the urban network spatial pattern stabilizes. However, due to differences in key urban resources and location conditions, significant hierarchical structures remain in urban connectivity and inter-city linkage intensity. Urban network status and functions show continuous hierarchical differentiation: core-status cities are hubs in the financial resource flow network within the national urban system, bearing command and control center functions for the overall network; peripheral-status cities are locations of branches, bearing functions of providing financial services for their local regions.

## 4 Conclusions

Based on China's securities service enterprise network data and the interlocking network model to define inter-city linkages, this paper analyzes the evolution characteristics and influencing factors of the core-periphery structure of China's urban network, reaching the following conclusions:

- 1) China's urban network exhibits evolutionary characteristics of a core-periphery structure. From 2005 to 2019, the size of the core block expanded rapidly, and the distribution of urban coreness tended to decentralize, driving China's urban network toward a polycentric pattern. The core-periphery structure aligns with existing economic spatial patterns, with the core block mainly composed of core cities in China's major urban agglomerations. The location advantages of cities in the Beijing-Tianjin-Hebei, Yangtze River Delta, Pearl River Delta, and Chengdu-Chongqing regions are most prominent. The distribution of urban network connectivity converges to Zipf's law, indicating that China's urban network will exhibit persistent hierarchical structural characteristics.
- 2) Information hinterlands have a decisive impact on the differentiation of China's urban network status. Urban attribute characteristics such as political power, market potential, knowledge capital, air connectivity, and economic openness determine securities firms' ability to access valuable information flows, thereby constituting the foundation of the urban network's core-periphery structure. The influence of information hinterlands shows regional heterogeneity: political power, knowledge capital, air connectivity, and economic openness have greater marginal effects on the network power of cities in central and western regions, while market potential more significantly influences the power differentiation of cities in eastern regions. Urban network status is rooted in its influence in the "space of places," meaning that urban network development tends to amplify existing inter-city economic development gaps.

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