

THE SHAREHOLDING SIMILARITY OF THE WORLDWIDE LISTED  
ENERGY COMPANIES' SHAREHOLDERS: BASED ON TWO-MODE  
NETWORK AND DERIVED HOLDING-BASED NETWORK

Li Hua-jiao, School of Humanities and Economic Management, China University of Geosciences,  
Beijing, Phone

+8610 8232 2073, E-mail: babyproud@126.com

Fang Wei, School of Humanities and Economic Management, China University of Geosciences,  
Beijing, Phone

+8610 8232 2073, E-mail: itasstudio@126.com

An Haizhong, School of Humanities and Economic Management, China University of  
Geosciences, Beijing,

Phone +8610 82323783, E-mail: ahz369@163.com

Yan Lili, Guanghua School of Management, Peiking University, Phone +8610 82322073, E-mail:  
llyanll@163.com

#### Overview

Two-mode and multi-mode network are the new directions of complex network which can simulate the relationships among the entities more precisely. In this paper, we constructed two-mode networks of the energy listed companies and their shareholders on the basis of two-mode method of complex theory, and then we constructed the derived one-mode holding-based network based on the equivalence network theory. We calculated two different topological characters of the two networks, that is the out-degree of the actor nodes of the two-mode network (9003 nodes), and the edges' weights of the one-mode network (619,766 edges), and we analyzed the distribution features of both of the two topological characters. In this paper we define both the weighted and un-weighted Shareholding Similarity Coefficient, we took the data of the worldwide listed energy companies and their shareholders as empirical study subject, and calculated and compared both the weighted and un-weighted shareholding similarity coefficient of the worldwide listed energy companies. The result shows that: (1) both the out-degree of the actor nodes of the two-mode network and the edges' weights of the one-mode network follow power-law distribution; (2) there are huge differences between weighted and un-weighted shareholding similarity coefficient of the worldwide listed energy companies, and the weighted shareholding similarity coefficient is of greater regularity than the un-weighted one; (3) there are a vast majority of shareholders who hold and only hold one or few listed energy companies' stock. (4) there shareholders hold the same listed energy companies' stock when the value of the un-weighted shareholding similarity coefficient is between 0.4 and 0.8. The study will be a helpful tool to analyze the relationships of one-mode network's nodes which is constructed based on the two-mode network, and it is of great importance to discover the similarity of the shareholding behaviors between the shareholders, and it will be useful for the further researches about the stability of the energy institutes' structure and the risk of the energy stock market.

The paper is organised as follows: After the introduction the second section gives a brief overview about the data and method. The third section addresses the calculation and analysis. In section four we describe the discussion and conclusion.