

Article

Do Social Networks of Listed Companies Help Companies Recover from Financial Crises?

Szu-Hsien Lin ¹, Tzu-Pu Chang ² , Huei-Hwa Lai ^{3,*} and Zi-Ying Lu ²

¹ Department of Accounting and Information Systems, Asia University, Taichung 41354, Taiwan; aleclin.tw@gmail.com

² Department of Finance, National Yunlin University of Science and Technology, Yunlin 64002, Taiwan; changtp@yuntech.edu.tw (T.-P.C.); m10924007@gmail.yuntech.edu.tw (Z.-Y.L.)

³ Department of Business Administration, Chaoyang University of Technology, Taichung 413310, Taiwan

* Correspondence: edithlai2005@gm.cyut.edu.tw

Abstract: This study aims to examine how the social networks of top management affect the recovery of their companies when facing a financial crisis. We mainly use the logit and Cox regression models to investigate whether social networks help overcome the financial distress and shorten the crisis duration. The empirical findings suggest that companies with characteristics of low degree centrality of the chairman's bank networks and high closeness centrality of the general manager's general networks and bank networks are more likely to overcome financial distress and get back to normal status. Furthermore, for companies with characteristics of low degree centrality of the chairman's personal general networks, low closeness centrality of the financial executive's personal general networks, and high degree centrality of the financial executive's personal bank networks, it was easier to shorten the crisis duration. The practical implication is that companies need to prioritize quality over quantity in order to survive or shorten the crisis. All company top managers should not look only at the size of the company but consider how the social network is configured.

Keywords: social network; degree centrality; closeness centrality; financial crisis; logit regression; cox regression



Citation: Lin, S.-H.; Chang, T.-P.; Lai, H.-H.; Lu, Z.-Y. Do Social Networks of Listed Companies Help Companies Recover from Financial Crises? *Sustainability* **2022**, *14*, 5044. <https://doi.org/10.3390/su14095044>

Academic Editor: Sajid Anwar

Received: 21 February 2022

Accepted: 20 April 2022

Published: 22 April 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Research on financial distress has always been a critical topic in the field of finance. Since the 1960s, scholars have extensively studied the causes, consequences, and implications of financial distress from different perspectives. Many studies at that time discussed the causes for financial distress or established early-warning models to avoid future financial distress. Over the recent decades, the research direction has changed to discuss the influence of certain factors on financial distress and find out the approaches that firms can use to overcome financial distress and regain a normal status.

Social networks have gradually gained importance, since social capital is considered to add value to enterprises and improve their operating performance. Kilduff and Tsai [1] suggest that firms connect with external parties to obtain external social capital, and social capital is an essential strategic resource. They can benefit from gaining information or business opportunities through such resources. The literature on social capital identifies knowledge access as an important benefit, and some researchers such as Inkpen and Tsang [2] also address how social capital affects knowledge transfer between network members.

With the emergence of the knowledge-based economy, the acquisition of funds, technologies, and information is no longer limited to specific sources. Consequently, when facing fierce competition on the market, firms should no longer rely solely on their internal resources but instead develop connections with other stakeholders. Only through mutual

collaboration and resource sharing will companies create a reciprocal relationship beneficial to all involved parties. Therefore, using social networks to increase the operating performance of companies has become one of the main strategies adopted for enhancing competitive advantages or solving financial problems. Although the value of social networks cannot be measured precisely in financial terms, their potential in creating profits for enterprises in practice is an intangible asset that cannot be ignored.

The term “network” refers to various associations between parties, where psychological, interpersonal, and informational needs may contribute to the formation of networks. The social network can be simply called a structure composed of social relations, which were formed between individuals or groups connected to other individuals or groups, including kinship relations (kinship relations), market relations (market relations), class relations (hierarchy relations) and other types of relationships [3]. These connections are interdependent, rather than treating them as independent individuals. Individuals or groups can maintain a certain social identity and establish social contacts through these networks, as a channel for resource transfer and circulation, and obtain relevant information.

Network analysis has been favored by many researchers in recent years. The network analysis here is also called social network analysis (SNA) in the field of social sciences [4,5]. Early scholars may use the number of connections or virtual variables (with or without external connections) as the explainer or explanatory variables of the company. They support that network relationships will have an impact on business/bank operations, but these impacts are positive and negative, and the literature also provides explanations for different directions of influence. Lavie [6] points out that if a company wants to survive in the market, it must obtain more information and resources from the outside world, and the social network is one of the channels for the company to obtain information and resources. Consequently, social networks can help a company achieve better performance, and then help the company recover from financial distress.

There are other studies that explain why social networks can influence companies' financial performance or their ability to overcome a crisis. Yu and Chiu [7] indicate that a variety of studies (such as [8–12]) demonstrate that social networks provide several benefits to firms, such as learning benefits, coordination benefits, performance benefits, and an increase in legitimacy. Pratono [13] explains the complex relationship between social networks and firm performance by introducing trust as a mediator and provides evidence that trust plays a pivotal role in social networks.

Lins, Servaes, and Tamayo [14] suggest that social capital is an investment that pays off when corporations and markets suffer a downturn in trust. They claim that trust between a business and its stakeholders and investors can be built through investments in social capital. As suggested by Sapienza and Zingales [15], trust is an asset crucial to a company, even if it is not made of bricks and mortar.

Liu, Chiu, and Wang [16] investigated the value of external social networks of directors, Chief Executive Officers (CEOs), and Chief Financial Officers (CFOs), with a focus on their effects on bank loans. Their findings suggest that social networks of CEOs, CFOs, and board members, if not over-connected, can contribute to a reduction in bank loan spread and liquid collateral requirements. This is particularly true for networks with financial institutions. Similarly, He, Xu and McIver [17] note that political connections increase the likelihood of distressed firms gaining debt financing and increase their recovery chances.

By establishing alliances with partners who have strong capabilities and broad social capital, firms can create value, growth, technological knowledge, and legitimacy through new knowledge resources [18,19]. In addition, Zheng, Singh, and Mitchell [20] propose resource dependence and resource-based theories to explain why political connections can enhance both firm survival and performance. Liu, Wu, and Li [21] suggest that applying network-based variables together with a GA-based gradient boosting method can lead to improved performance for predicting financial distress in terms of accuracy, recall, precision, and F-score.

From the above studies, we can infer that the intensity of social networks can not only help predict financial distress, but also help predict whether a company will make a turnaround when facing financial distress. The early literature focuses on the social network as variables in predicting finance distress or evaluating business performance [22–24]. They do not mention how and how long it takes to overcome the finance distress for business. Therefore, we investigate whether social networks of a company, including general networks and bank networks, can help a company recover from financial distress and shorten the period of the crisis.

This study mainly focuses on social networks, an intangible asset in corporate finance/governance. In this study, listed companies in Taiwan that experienced financial distress from 2007 to 2015 are investigated. A total of 81 companies are identified as having experienced financial distresses, and on average, approximately 10 companies came across unfavorable major events every year. Herein, social networks are used as major research indicators of a company's external resources to overcome financial distress and shorten distress duration. In addition, the social network analysis is adopted to evaluate each company's social networks.

Rather than focusing on the number of a company's internal and external relationships and connections as in the literature, we examined the overall networks (namely, general networks and bank networks) of firms based on the education, past experiences, and occupations of executives and insiders. In sum, the study's objectives are as follows. First, determining whether the social networks (namely, general networks and bank networks) of chairmen, general managers, financial executives, and company members help companies overcome financial crises and regain a normal status. Second, determining whether the social networks of chairmen, general managers, financial executives, and company members help companies shorten the crisis duration.

The rest of the paper is organized as follows. Relevant literature is discussed in Section 2; Section 3 outlines the methodology adopted and data processing. In Section 4, the empirical findings are proposed; the conclusion and implications are expressed in Section 5.

2. Relevant Literature

The term "social network" was initially proposed by Barnes [25] to represent a set of explicit social relationships. It originated from a discussion in professional fields such as sociology, anthropology, and psychology. This viewpoint was popular among Western scholars and experts in the 1960s in terms of interpersonal relationships and interactive behaviors. In recent years, the concept has been applied extensively to the analysis of economic activities. The concepts of social network and "networkability" are similar. They are both centered on people and a flexible application of interpersonal interactions.

Social networks have become the main topic of discussion in new research fields such as corporate governance, business performance, and organizational strategy, in addition to the usual fields in which the networks are investigated. A network is a set of connections, and the formation of a network is induced by humans' psychological needs and need for survival, information, interpersonal relationships, and collective identity. Social networks can simply be defined as structures formed by social relationships. They represent social relationships between individuals or groups, including kinship relations, market relations, hierarchical relations, and other types of relations [3].

The existence of these connections provides individuals and groups with opportunities for social recognition and contact, as well as facilitating the transfer of resources and the circulation of information. Although the definition of social network differs among scholars, it can be separated into various aspects according to its intensions. Aldrich and Dubini [26] categorized social network relations into personal networks and extended networks, and O'Donnell, Gilmore, and Cummins [27] divided social networks into personal networks and interorganizational networks.

Scholars have also reported widely different characteristics for social networks according to the study topics or sample subjects. For example, network size is the number of

forming actors (node number). Network scale reflects the actors' heterogeneity. Network density is the ratio of the number of interactive relations between actors to the number of all possible interactive relations. Network composition is also an indicator. These indicators all help precisely reflect the characteristics of each network. To discuss location within a social network, centrality can be used as a measuring index.

Freeman [28] indicated that centrality can be divided into three types: degree centrality, closeness centrality, and betweenness centrality. Degree centrality measures the most crucial people in a group. Closeness centrality represents the centrality degree of a node based on distance. Betweenness centrality refers to an individual's ability as a medium, namely its potential in becoming a bridge. This study uses the SNA as a main basis for measuring the variables of social networks. When measuring the centrality degrees of listed companies, the two indicators of degree, centrality and closeness centrality, serve to express the social networks (namely, general networks and bank networks) of chairmen, general managers, financial executives, and company members.

A financial crisis refers to a situation in which a company has insufficient operating funds to pay off due liabilities. It is a reflection of long-term economic resource loss or problems induced by long-term poor operating conditions. It reflects an enterprise's gradual deterioration that ultimately leads to failure, not a single accidental event. However, a company that has difficulty paying short-term liabilities can be viewed as experiencing a financial crisis as well. Usually, a financial crisis is associated with financial distress, financial failure, or poor performance. Because of the differences in laws and systems across countries, no clear and uniform term has been defined.

Although scholars and experts have varying opinions and terms to define and explain financial crises, they have provided numerous detailed and precise arguments that led subsequent scholars to continue the exploration of the underlying mechanism of financial crises. In the 1990s, researchers extended the definition of financial crises to the operation aspect of companies to enable an early diagnosis of financial crises in a company to prevent it. A broad criterion of a potential crisis is when poor short-term performance occurs, it can be considered a financial crisis. The poor short-term performance can be reflected on the financial figures, such as net income before taxes, earnings after taxes, and the operating status of a company.

In the era of the globalized knowledge-based economy, social networks are key to beating the competition among enterprises. A robust and comprehensive corporate governance mechanism increases a company's operating performance and displays its external market value. The increasing popularity of collaborations between companies has led to a multiplicity of research studies concerning the influence of social networks on the behaviors and performance of enterprises [29–33]. The social capital of a network enables its members to obtain and use resources [2,34], and further increases knowledge transfer and acquisition [35] and operating performances [36,37].

3. Data and Methodology

This study adopted the crisis event classification from the database of the Taiwan Economic Journal (henceforth referred to as TEJ) as a judging standard to define financial crises. Based on TEJ's classification, there are 16 types of financial crises, such as bankruptcy, restructuring, bouncing, etc. A company encountering any substantial or non-substantial financial crisis events included in the classification is considered to be experiencing financial crisis. Whether a company has weathered a financial crisis is determined according to the presence of a "crisis end day", as defined in the TEJ database.

The sample of companies undergoing financial crises excluded finance and insurance businesses. The sampling period was set from 1 January 2007 to 31 December 2015. The day when a company was determined to have weathered a financial crisis was the day the financial crisis ended. If more than one financial crisis occurred during the study period, the last record of financial crisis end day was used. A total of 81 companies,

including 52 companies that weathered financial crises ($y = 1$) and 29 companies that did not overcome financial crises ($y = 0$), were selected as the study sample.

To analyze social networks, the chairmen, general managers, financial executives, and all members of these companies were analyzed individually 1 year before the financial crisis events. Obtained from the corporate governance database of TEJ, their educational background, past experiences, and status of concurrent working in the three positions were adopted as the connections in networks and used as indicators to measure the degree centrality and closeness centrality of social networks.

This study investigated whether social networks help a company in financial crises overcome the crisis and regain a normal status. A number of studies (e.g., [38–40]) use logit regression to predict whether a company in financial distress can make a turnaround. The variables of a logit regression do not have to be normally distributed, linearly related, or have equal variance within a group [41]. This technique emphasizes the probability that a particular outcome will occur in each case.

The dependent variable in our logit regression was used to represent two types of companies in financial crises: (1) $y = 0$, companies that did not overcome the financial crises; (2) $y = 1$, companies that weathered the financial crises. A logit regression model is used when a dependent variable is binary (in this study, “overcame the crisis” and “did not overcome the crisis”). In addition, assumptions were not required for the independent variable distribution. Each independent variable could be a continuous, discrete, or dummy variable. With k variables, in a multiple regression analysis, the mean of y or expected value $E(y)$ is determined by a multiple regression, Equation (1):

$$E(y) = \beta_0 + \beta_1 x_1 + \dots + \beta_p x_k \quad (1)$$

If $E(y)$ is explained by probability, then the logit regression equation is as follows:

$$E(y) = P(y = 1 | x_1, x_2, \dots, x_k), \quad (2)$$

where y is the dependent variable; $y = 1$ represents a company that weathered a financial crisis; $y = 0$ represents a company that did not overcome a financial crisis; independent variables are x_1, x_2, \dots, x_k ; and $\beta_0, \beta_1, \beta_2, \dots, \beta_k$ are the regression coefficients. It is noteworthy that a probit regression can be applied when the dependent variable is a dichotomous outcome. Therefore, we also performed a probit regression and found that all results were consistent.

We tested whether social networks help companies in financial crises to shorten the crisis duration using Cox regression, which is widely used in survival analysis for public and medical research. In public health, it can be used to estimate the mortality hazards associated with patients’ behavior [42]. Some other researchers apply Cox regression to investigate the failure or “survival time” of investments [43].

The number of days spent in financial crises for the companies that weathered the crisis was incorporated as the dependent variable for our Cox regression analysis. Cox regression is a multifactor method of analyzing survival data with missing data. It allows for the concurrent analysis of the effects of multiple related factors on survival time, as well as the inclusion of an independent variable, which changes over time, in the model.

Independent variables are represented by $X = (X_1, \dots, X_k)$, and $h_0(t)$ represents the baseline hazard function, which is a risk function of t when all variables are zero. The proportional hazard model can be expressed as follows:

$$h(t, x) = e^{\beta x} h_0(t) \quad (3)$$

By moving the baseline hazard function to the left side of Equation (3) and converting it into a logarithm, the following is obtained:

$$\ln \left[\frac{h(t, X)}{h_0(t)} \right] = \beta X \quad (4)$$

Therefore, under the effects of time t and independent variable X , the ratio of the individual risk function to the baseline hazard function is independent of time, that is, it does not change with time t . By contrast, the baseline hazard function $h_0(t)$ is only dependent on time and not influenced by X . Consequently, in the proportional hazard model, time t and independent variable X do not interact, which is the basic assumption of the Cox model.

This study aims to investigate whether social networks can help companies in financial crisis get through the crisis and return to normal business operations. We also examine whether social networks can help shorten the duration of the financial crisis. The two models are as following.

Logit regression:

In our logit regression, our dependent variable y varies with the type of companies in financial crisis, which fall into two categories: (1) $y = 0$, companies that have not survived financial crisis, and (2) $y = 1$, companies that have survived the financial crisis.

Logit regression is used to examine whether the control variables and social network variables (degree centrality of general network, closeness centrality of general network, degree centrality of bank network, and closeness centrality of bank network) help overcome the financial crises encountered by listed companies. Because of missing data on five companies, the sample size was adjusted from 81 to 76, and logit regression was adopted to establish two regression models as follows:

Model 1:

$$y_i = \beta_0 + \beta_1 \text{SEO} + \beta_2 \text{nonoperating} + \beta_3 \text{depFixedAsset} + \beta_4 \text{accountsreceivable} + \beta_5 \text{longtermloan} \\ + \beta_6 \text{companysize} + \beta_7 \text{revgrowth} + \beta_8 \text{cashflow} + \beta_9 \text{compensation} + \beta_{10} \text{personnelchange} \\ + \beta_{11} \text{ceo duality} + \varepsilon_i$$

Model 2:

$$y_i = \beta_0 + (\beta_1 \text{SEO} + \dots + \beta_{11} \text{ceo duality}) + \beta_{12} (\text{Degree}_M / \text{Close}_M / \text{Degree}_{BM} / \text{Close}_{BM}) \\ + \beta_{13} (\text{Degree}_{AM} / \text{Close}_{AM} / \text{Degree}_{ABM} / \text{Close}_{ABM}) \\ + \beta_{14} \text{chairmanseniority} + \beta_{15} (\text{Degree}_C / \text{Close}_C / \text{Degree}_{BC} / \text{Close}_{BC}) \\ + \beta_{16} \text{ceoseniority} + \beta_{17} (\text{Degree}_G / \text{Close}_G / \text{Degree}_{BG} / \text{Close}_{BG}) \\ + \beta_{18} \text{cfoseniority} + \beta_{19} (\text{Degree}_F / \text{Close}_F / \text{Degree}_{BF} / \text{Close}_{BF}) + \varepsilon_i$$

Cox regression:

In this model, our dependent variable day_i is the number of days the company took to recover from its financial crisis.

Cox regression is used to examine whether the control variables and social network variables of listed companies could shorten the duration of their financial crisis. Model 3 and Model 4 for Cox regressions are as follows:

Model 3:

$$\text{day}_i = \beta_0 + \beta_1 \text{SEO} + \beta_2 \text{nonoperating} + \beta_3 \text{depFixedAsset} \\ + \beta_4 \text{accountsreceivable} + \beta_5 \text{longtermloan} \\ + \beta_6 \text{companysize} + \beta_7 \text{revgrowth} + \beta_8 \text{cashflow} \\ + \beta_9 \text{compensation} + \beta_{10} \text{personnelchange} \\ + \beta_{11} \text{ceo duality} + \varepsilon_i$$

Model 4:

$$\begin{aligned} \text{day}_i = & \beta_0 + (\beta_1 \text{SEO} + \dots + \beta_{11} \text{ceo duality}) + \beta_{12} (\text{Degree}_M / \text{Close}_M / \text{Degree}_{BM} / \text{Close}_{BM}) \\ & + \beta_{13} (\text{Degree}_{AM} / \text{Close}_{AM} / \text{Degree}_{ABM} / \text{Close}_{ABM}) + \beta_{14} \text{chairmanseniority} + \beta_{15} (\text{Degree}_C / \text{Close}_C / \text{Degree}_{BC} / \text{Close}_{BC}) \\ & + \beta_{16} \text{ceoseniority} + \beta_{17} (\text{Degree}_G / \text{Close}_G / \text{Degree}_{BG} / \text{Close}_{BG}) \\ & + \beta_{18} \text{cfoseniority} + \beta_{19} (\text{Degree}_F / \text{Close}_F / \text{Degree}_{BF} / \text{Close}_{BF}) + \varepsilon_i \end{aligned}$$

In this study, we follow [4,16] in proposing the measures of external social networks and other control variables. The selected control variables included seasoned equity offering (SEO), ratio of non-operating income to total income, growth rate of depreciable fixed assets, receivable turnover rate, making or repayment of long-term loans, company size, revenue growth rate, cash flow right, average compensations for board directors and supervisors, and number of personnel changes among chairmen, general managers, and financial executives in Appendix A.

With respect to the period for control variables, SEO, personnel change, and CEO duality are counted during the crisis period. Other control variables are obtained at the year when the crisis starts. The social network variables (namely, general network and bank network) include two types of indicators, degree centrality and closeness centrality, with a total of six major items, such as personal networks, networks of company members collectively, and average networks of company members, and 20 other variables in Appendix B.

4. Empirical Findings

Descriptive Statistics

The descriptive statistics are presented in Table 1. For control variables, the minimum ratio of non-operating income to total income (non-operating) was -1574.07 , the maximum was 52, the mean was -31 , and the standard deviation was 180.09, indicating that the sample companies had considerable differences in the percentage of non-operating income in their total income. The minimum average compensation (compensation) was 0, the maximum was 1293, the mean was 193.38, and the standard deviation was 268.72, indicating that the sample companies exhibited heterogeneity in their average compensation for directors and supervisors. We transformed three variables (*longtermloan*, *companysize*, and *compensation*) using logarithms (with a positive number added to *longtermloan* and *compensation* to ensure all their values are larger than zero).

Table 1. Summary of Statistics.

| Variables | Whole Name | Unit | Mean | Std | Min | Max |
|--------------------|---|--------------------------|----------|--------|-----------|--------|
| SEO | Seasoned equity offering | dummy | 0.21 | 0.41 | 0.0 | 1 |
| Non-operating | Ratio of non-operating income to total income | % | -31.00 | 180.09 | -1574.7 | 52 |
| depFixedAsset | Growth rate of depreciable fixed assets | % | -18.65 | 29.05 | -96.4 | 54 |
| accountsreceivable | Receivable turnover rate | % | 37.09 | 246.37 | 1.0 | 2220 |
| debt_ratio | Ratio of total debt to total assets | % | 64.22 | 21.72 | 1.82 | 142.27 |
| longtermloan | Making or repayment of long-term loans | NT\$ (10 billion) in log | 3.06 | 0.63 | -2.30 | 3.91 |
| companysize | Company size | NT\$ (10 billion) in log | 9.03 | 0.64 | 8.12 | 11.00 |
| revgrowth | Revenue growth rate | % | -8.17 | 43.17 | -97.5 | 165 |
| cashflow | Cash flow right | % | 19.96 | 17.62 | 0.0 | 95 |

Table 1. Cont.

| Variables | Whole Name | Unit | Mean | Std | Min | Max |
|-------------------|---|------------------------|------------|------------|-----------|-----------|
| compensation | Average compensation for board directors and supervisors | NT\$ (thousand) in log | 4.25 | 1.69 | 1.10 | 7.17 |
| personnel change | Number of personnel changes among chairmen, general managers, and financial executives | Times | 2.56 | 2.83 | 0.0 | 12 |
| CEO duality | Whether the chairman works concurrently as the general manager. If yes, dummy variable = 1, 0 otherwise | dummy | 0.40 | 0.49 | 0.0 | 1 |
| chairmanseniority | chairman seniority | Years | 13.47 | 9.16 | 0.0 | 36 |
| ceoseniority | CEO seniority | Years | 11.67 | 9.21 | 0.3 | 36 |
| cfooseniority | CFO seniority | Years | 6.55 | 6.04 | 0.1 | 36 |
| Degree_M | Total interpersonal relationships of company members | | 23,150.44 | 26,387.58 | 2218.0 | 173,797 |
| Degree_AM | Average interpersonal relationships of company members | | 1348.20 | 1733.08 | 130.5 | 11,586 |
| Degree_C | Total interpersonal relationships of chairman | | 1366.57 | 2600.77 | 15.0 | 15,800 |
| Degree_G | Total interpersonal relationships of general managers | | 1006.77 | 1884.29 | 16.0 | 15,748 |
| Degree_F | Total interpersonal relationships of financial executives | | 1327.70 | 2759.17 | 15.0 | 19,453 |
| Close_M | Sum of shortest distances for company members | | 395,994.63 | 168,189.88 | 169,479.8 | 1,270,891 |
| Close_AM | Average shortest distance for company members | | 22,347.47 | 1215.39 | 19,775.4 | 27,548 |
| Close_C | Sum of shortest distances for chairmen | | 22,430.46 | 1629.25 | 19,542.1 | 29,740 |
| Close_G | Sum of shortest distances for general managers | | 22,227.36 | 1447.21 | 17,392.5 | 29,710 |
| Close_F | Sum of shortest distances for financial executives | | 22,353.27 | 1675.92 | 17,875.5 | 30,973 |
| Degree_BM | Total bank relations of company members | | 2516.93 | 3600.65 | 201.0 | 24,866 |
| Degree_BAM | Average bank relations of company members | | 152.57 | 250.31 | 12.6 | 1658 |
| Degree_BC | Total bank relations of chairmen | | 135.72 | 371.67 | 0.0 | 2259 |
| Degree_BG | Total bank relations of general managers | | 91.02 | 265.90 | 0.0 | 2259 |
| Degree_BF | Total bank relations of financial executives | | 162.49 | 409.22 | 0.0 | 2922 |
| Close_BM | Sum of shortest distances for company members | | 29,139.63 | 15,037.92 | 7227.3 | 104,153 |
| Close_BAM | Average shortest distance for company members | | 1641.76 | 429.99 | 425.1 | 2992 |
| Close_BC | Sum of shortest distances for chairmen | | 1690.21 | 633.00 | 0.0 | 3393 |

Table 1. Cont.

| Variables | Whole Name | Unit | Mean | Std | Min | Max |
|-----------|--|------|---------|--------|-----|------|
| Close_BG | Sum of shortest distances for general managers | | 1579.07 | 696.11 | 0.0 | 3393 |
| Close_BF | Sum of shortest distances for financial executives | | 1703.74 | 638.72 | 0.0 | 3650 |
| N | | 81 | | | | |

For social network variables, regarding general networks, the minimum of the networks of company members collectively (Degree_M) was 2218, the maximum was 173,797, the mean was 23,150.44, and the standard deviation was 26,387.58, indicating that the sample companies had substantial differences in their members' general relations. The minimum distance for financial executives (Close_BF) was 0, the maximum was 3650, the mean was 1703.74, and the standard deviation was 638.72. It appears that financial executives and banks had very different relationships in the sample companies. Therefore, the variables were suitable for analysis in this study.

In Table 2, we display the logit regression analysis results on whether social networks played a role in helping publicly listed companies survive a financial crisis. Model 1 and Model 2 were used to separately analyze whether the control variables and social network variables (degree centrality of general network and closeness centrality of general network) helped the companies in financial crises overcome them. The regression results showed that among the control variables, *longtermloan* presented a significantly negative coefficient in Model 1, showing that a company tends to recover from a crisis if it can repay the long-term loan.

Table 2. Analysis Results of Logit Regression (General Network).

| | Model 1 | | Model 2 | | |
|--------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | | Degree | Degree# | Closeness | Closeness# |
| SEO | −1.21 (−1.39) | −1.56 (−1.52) | −1.52 (−1.50) | −2.54 * (−1.67) | −2.75 * (−1.77) |
| nonoperating | −0.00 (−1.11) | −0.00 ** (−1.98) | −0.00 (−0.56) | −0.00 (−0.68) | 0.00 (0.62) |
| depFixedAsset | 0.01 (0.97) | 0.00 (0.20) | 0.00 (0.17) | 0.02 (0.86) | 0.02 (1.13) |
| accountsreceivable | 0.07 (1.38) | 0.11 * (1.77) | 0.09 (1.52) | 0.11 ** (2.23) | 0.12 ** (2.51) |
| debt_ratio | 0.02 (0.96) | 0.03 * (1.75) | 0.03 (1.57) | 0.03 (1.14) | 0.03 (1.17) |
| longtermloan | −10.08 ** (−2.06) | −2.60 (−0.68) | −8.90 * (−1.71) | −15.41 (−1.37) | −21.49 ** (−2.36) |
| companysize | −1.68 *** (−2.91) | −2.59 *** (−3.21) | −2.18 *** (−2.95) | −2.11 *** (−2.59) | −1.95 *** (−2.77) |
| revgrowth | 0.00 (0.12) | 0.01 (0.81) | 0.00 (0.28) | −0.00 (−0.16) | −0.01 (−0.79) |
| cashflow | 0.03 (1.26) | 0.04 ** (2.16) | 0.04 * (1.69) | 0.04 * (1.67) | 0.03 (1.36) |
| compensation | 0.01 (0.04) | 0.09 (0.60) | 0.05 (0.39) | −0.10 (−0.54) | −0.05 (−0.32) |
| personnel change | 0.07 (0.59) | 0.07 (0.52) | 0.05 (0.37) | 0.27 (1.30) | 0.29 (1.47) |
| Ceo duality | −1.56 ** (−1.99) | −1.33 (−1.62) | −1.16 (−1.49) | −1.71 * (−1.69) | −1.55 * (−1.78) |
| Degree_M/Close_M | | 0.00 (1.47) | 0.00 (1.09) | −0.00 (−0.96) | −0.00 (−1.28) |

Table 2. Cont.

| | Model 1 | | Model 2 | | |
|-----------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | | Degree | Degree# | Closeness | Closeness# |
| Degree_AM/Close_AM | | −0.00 (−0.77) | −0.00 (−0.42) | 0.00 (0.52) | 0.00 (0.57) |
| Chairmanseniority | | 0.10 (1.36) | 0.08 (1.14) | 0.05 (0.62) | 0.03 (0.34) |
| Degree_C/Close_C | | −0.00 (−0.33) | −0.00 (−0.56) | 0.00 (0.36) | 0.00 (0.19) |
| Ceoseniority | | −0.14 * (−1.82) | −0.13 * (−1.75) | −0.07 (−0.98) | −0.06 (−0.91) |
| Degree_G/Close_G | | −0.00 (−0.93) | −0.00 (−0.70) | −0.00 * (−1.85) | −0.00 * (−1.95) |
| Cfoseniority | | 0.14 * (1.74) | 0.12 * (1.62) | 0.14 * (1.76) | 0.14 * (1.74) |
| Degree_F/Close_F | | −0.00 (−1.21) | −0.00 (−0.84) | −0.00 (−1.10) | −0.00 (−1.07) |
| intercept | 46.24 *** (2.67) | 28.01 ** (2.22) | 44.57 ** (2.24) | 85.99 ** (2.32) | 105.23 *** (3.15) |
| N | 76 | 76 | 76 | 76 | 76 |
| pseudo R ² | 0.25 | 0.37 | 0.33 | 0.40 | 0.39 |
| AUC | 0.82 | 0.89 | 0.87 | 0.90 | 0.89 |
| goodness-of-fit test | 65.37 (<i>p</i> = 0.39) | 56.08 (<i>p</i> = 0.43) | 59.53 (<i>p</i> = 0.31) | 58.79 (<i>p</i> = 0.34) | 59.70 (<i>p</i> = 0.31) |

Degree# and Closeness# indicates the results of winsorization approach, with t statistics (using robust standard errors) in parentheses. Goodness-of-fit test is Pearson's chi-square test. The symbols *, **, and *** denotes $p < 0.1$, $p < 0.05$, and $p < 0.01$ respectively.

Company size showed significant and negative coefficients, meaning that the smaller the company size, the easier it was to overcome the financial crisis. That is, for companies with a smaller paid-up capital, the demand for operating funds is lower than that of larger-size companies when encountering a financial crisis. Therefore, smaller companies spent less to overcome from the operating predicament. The variable regarding whether a company's chairman working concurrently as the general manager exhibited significant and negative coefficients in both models, meaning that a company whose chairman does not concurrently work as the general manager is more able to overcome financial crises.

If a chairman is not concurrently working as the general manager, this indicates that the company is under comprehensive supervision and serves as a check and balance. The manipulation level of the company's revenue is thus lower, which reduces the risk of a financial crisis. The rest of the regression results are described by social network variables as follows:

(1) Degree centrality of general networks:

Cash flow right demonstrated a significantly positive coefficient in Model 2, meaning the higher the cash flow right of the company, the easier it was to overcome the financial crisis. That is, whenever a company faces operating difficulties, the larger the proportion of controlling shareholders to the company's capital contribution, the more supportive the shareholders are, and the more likely the company will survive the crisis events.

The variable of the general manager's seniority is significantly negative in Model 2, which means that the lower the seniority of the general manager, the better the company's chances of surviving a financial crisis. Since the odds ratio of *Ceoseniority* is around 0.87 ($\exp(-0.14)$), it indicates that the chance of a company overcoming a financial crisis is 0.87 times the chance of a company not overcoming the financial crisis if the CEO increases their tenure by one year. This study infers that the company should replace the actual decision maker (that is, the CEO) after a financial crisis is over.

The financial executive seniority showed a significant and positive coefficient, meaning that the longer the seniority of the financial executive, the easier it was to overcome

the financial crisis. That is, the longer the financial executive's tenure is, the more experience the executive has, and thus the more capable the executive is when facing decision-making situations regarding operation, investment, or fundraising during the company's operating predicament.

According to the odds ratio ($1.15 = \exp(0.14)$), the chance of a company overcoming a financial crisis is 1.14 times the chance of a company not overcoming a financial crisis if the CFO increases tenure by one year. The fourth and sixth column of Table 2 show the estimation result via a winsorization approach, in which we winsorize the top and bottom 2.5% data points for all control variables. The conclusion is consistent with the original estimation.

(2) Closeness centrality of general networks:

Among the control variables, seasoned equity offering (SEO) showed a significant and negative coefficient in Model 2, meaning the smaller the SEO, the easier it is to overcome the financial crisis. This study infers that capital increase may improve short-term performance in a crisis event, but the additional expense required for fundraising is also considerable. Therefore, it does not have a positive influence on crisis resolution. The *accountsreceivable* presented a significant and positive coefficient, meaning that the higher the receivable turnover rate was, the easier it was to overcome the financial crisis.

Regarding the closeness centrality, general managers' general networks had a significant and negative effect on recovery, meaning the closer a company's general manager was to other enterprises or their members in a general network, the easier it was to overcome financial crises. Specifically, when a general manager is close to other nodes in the network, he or she is close to the network's center position where all the other actors can be reached quickly, which is conducive to overcoming a financial crisis. Moreover, because the odds ratio of *Close_G* is 0.999, the chance of a company overcoming a financial crisis is 0.999 times the chance of a company not overcoming a financial crisis if the general manager increases one unit of his/her closeness centrality.

Table 3 presents the logit regression analysis results on whether the social networks of listed companies with the banking industry helped them overcome the crisis. Model 1 and Model 2 were used to separately analyze whether control variables and social network variables (degree centrality of bank network and closeness centrality of bank network) helped companies overcome a financial crisis. Since the effects of control variables are similar to Table 2, we focus on the results of network-related variables as follows:

(1) Degree centrality of bank networks:

For social network variables, the variable of total degree centrality of company members' bank networks showed a significant and positive coefficient, indicating the higher the total number of company members' bank networks is, the easier it is to overcome the financial crisis. That is, the more total connections company members had, the higher their degree centrality. In a social network, the actor nearest to the center can generate the most connections with other actors in the network and thus bring favorable influences on a company's chances of weathering financial crises. Based on the odds ratio of *Degree_BM* ($1.001 = \exp(0.001)$), the chance of a company overcoming a financial crisis is 1.001 times the chance of a company not overcoming a financial crisis if the whole members' degree centrality increases one unit.

Average degree centrality of company members' bank networks showed a significant and negative coefficient, meaning the lower the average number of bank networks of the company members was, the easier it was to overcome the financial crisis. This study infers that the reason why a large average number of connections failed to help overcome financial crises is that the larger board size, the better the ability to overcome the financial crisis, reducing the average number of connections. This also explains the phenomenon that a large total number but a small average number of connections proves beneficial. Additionally, the effects of general manager seniority and financial executive seniority are the same in comparison to Table 2.

Table 3. Analysis Results of Logit Regression (Bank Networks).

| | Model 1 | | Model 2 | | |
|-----------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | | Degree | Degree# | Closeness | Closeness# |
| SEO | −1.21 (−1.39) | −1.35 (−1.42) | −1.27 (−1.32) | −1.73 (−1.51) | −1.82 (−1.54) |
| Nonoperating | −0.00 (−1.11) | −0.00 ** (−2.01) | −0.01 (−0.91) | −0.00 (−1.38) | −0.00 (−0.38) |
| depFixedAsset | 0.01 (0.97) | 0.00 (0.06) | −0.00 (−0.03) | 0.01 (0.39) | 0.01 (0.40) |
| Accountsreceivable | 0.07 (1.38) | 0.12 * (1.93) | 0.09 (1.53) | 0.06 (1.20) | 0.06 (1.49) |
| debt_ratio | 0.02 (0.96) | 0.03 * (1.86) | 0.03 (1.61) | 0.03 (1.53) | 0.03 (1.45) |
| Longtermloan | −10.08 ** (−2.06) | −1.79 * (−1.66) | −11.39 ** (−2.10) | −11.40 (−1.36) | −15.56 ** (−2.41) |
| Companysize | −1.68 *** (−2.91) | −2.86 *** (−3.56) | −2.44 *** (−3.16) | −1.96 ** (−2.29) | −1.90 ** (−2.29) |
| Revgrowth | 0.00 (0.12) | 0.01 (0.75) | 0.00 (0.28) | 0.00 (0.32) | −0.00 (−0.07) |
| Cashflow | 0.03 (1.26) | 0.04 ** (2.34) | 0.04 * (1.86) | 0.03 (1.51) | 0.03 (1.43) |
| Compensation | 0.01 (0.04) | 0.09 (0.59) | 0.05 (0.32) | −0.12 (−0.75) | −0.11 (−0.81) |
| personnel change | 0.07 (0.59) | 0.05 (0.34) | 0.01 (0.32) | 0.07 (0.47) | 0.06 (0.38) |
| Ceo duality | −1.56 ** (−1.99) | −1.39 (−1.62) | −1.21 (−1.46) | −1.10 (−1.33) | −0.99 (−1.29) |
| Degree_BM/Close_BM | | 0.00 ** (2.56) | 0.00 ** (2.11) | 0.00 (0.00) | −0.00 (−0.15) |
| Degree_BAM/Close_BAM | | −0.02 ** (−2.04) | −0.01 (−1.53) | 0.00 (0.87) | 0.00 (1.01) |
| Chairmanseniority | | 0.11 (1.56) | 0.10 (1.32) | 0.07 (0.97) | 0.06 (0.83) |
| Degree_BC/Close_BC | | −0.00 (−1.26) | −0.00 (−1.37) | −0.00 (−0.18) | −0.00 (−0.33) |
| Ceoseniority | | −0.16 ** (−2.03) | −0.15 ** (−1.98) | −0.14 ** (−1.97) | −0.14 * (−1.94) |
| Degree_BG/Close_BG | | −0.00 (−1.18) | −0.00 (−0.82) | −0.00 (−1.54) | −0.00 (−1.53) |
| Cfoseniority | | 0.15 * (1.81) | 0.14 * (1.66) | 0.14 * (1.66) | 0.14 (1.58) |
| Degree_BF/Close_BF | | −0.00 (−1.28) | −0.00 (−0.82) | 0.00 (0.38) | 0.00 (0.75) |
| Intercept | 46.24 *** (2.67) | 27.58 *** (3.67) | 54.56 ** (2.54) | 51.95 ** (2.00) | 64.48 *** (2.97) |
| N | 76 | 76 | 76 | 76 | 76 |
| pseudo R ² | 0.25 | 0.41 | 0.36 | 0.35 | 0.33 |
| AUC | 0.82 | 0.90 | 0.89 | 0.88 | 0.87 |
| goodness-of-fit test | 65.37 (<i>p</i> = 0.39) | 52.87 (<i>p</i> = 0.57) | 56.56 (<i>p</i> = 0.42) | 58.59 (<i>p</i> = 0.35) | 61.34 (<i>p</i> = 0.26) |

Degree# and Closeness# indicates the results of winsorization approach, with t statistics (using robust standard errors) in parentheses. Goodness-of-fit test is Pearson's chi-square test. The symbols *, **, and *** denotes $p < 0.1$, $p < 0.05$, and $p < 0.01$ respectively.

(2) Closeness centrality of bank networks:

The results of the fifth and sixth columns are very similar to those of Table 2, showing that the effect of *Close_BG* is significantly negative. General manager seniority presented a significant and negative coefficient, meaning the shorter the seniority of the general manager was, the easier it was to overcome the financial crisis. Financial executive seniority

had a significant and positive coefficient, meaning the longer the seniority of the financial executive was, the easier it was to overcome the financial crisis.

Table 4 presents the Cox regression analysis results on whether the social networks of listed companies help them overcome their financial crises. Models 3 and 4 were employed to separately analyze whether the control variables and social network variables (degree centrality of general network and closeness centrality of general network) helped companies overcome their financial crises. The regression results revealed the following.

Table 4. Analysis Results of Cox Regression (General Networks).

| | Model 3 | | Model 4 | | |
|-----------------------|--------------------|------------------|---------------------|---------------------|-------------------|
| | | Degree | Degree# | Closeness | Closeness# |
| SEO | −0.05 (−0.14) | −0.49 (−1.11) | −0.51 (−1.09) | −0.27 (−0.56) | −0.10 (−0.20) |
| nonoperating | −0.00 (−1.42) | −0.00 (−0.40) | −0.01 (−1.38) | −0.00 (−0.90) | −0.01 (−1.38) |
| depFixedAsset | −0.01 (−1.12) | −0.01 (−1.02) | −0.00 (−0.49) | −0.01 (−0.79) | −0.00 (−0.23) |
| accountsreceivable | 0.00 * (1.85) | −0.00 (−0.15) | 0.02 *** (3.48) | −0.00 ** (−2.49) | 0.01 (0.56) |
| debt_ratio | −0.01 (−0.91) | −0.02 (−0.97) | −0.02 (−1.07) | −0.01 (−0.76) | −0.02 (−0.81) |
| longtermloan | −0.28 (−1.54) | −0.25 (−1.31) | 3.55 (1.43) | −0.33 (−1.10) | 6.00 ** (2.08) |
| companysize | −0.12 (−0.38) | −0.02 (−0.05) | 0.41 (0.77) | 0.03 (0.03) | 0.69 (0.88) |
| revgrowth | 0.01 ** (2.10) | 0.00 (0.74) | 0.00 (0.79) | 0.00 (0.82) | 0.01 (1.27) |
| cashflow | 0.01 (1.03) | 0.00 (0.19) | −0.00 (−0.20) | −0.00 (−0.30) | −0.00 (−0.21) |
| compensation | −0.01 (−0.27) | −0.04 (−0.51) | 0.02 (0.26) | −0.07 (−0.80) | 0.05 (0.36) |
| personnel change | −0.03 (−0.52) | −0.12 (−1.31) | −0.12 (−1.05) | −0.05 (−0.41) | −0.06 (−0.46) |
| Ceo duality | −0.73 * (−1.75) | −0.52 (−0.95) | −0.81 (−1.33) | −0.32 (−0.57) | −0.79 (−1.31) |
| Degree_M/Close_M | | −0.00 (−0.40) | −0.00 (−0.80) | −0.00 (−0.11) | −0.00 (−0.20) |
| Degree_AM/Close_AM | | 0.00 (0.20) | 0.00 (0.80) | 0.00 (0.22) | 0.00 (1.20) |
| Chairmanseniority | | −0.03 (−1.28) | −0.05 ** (−2.02) | 0.01 (0.22) | −0.02 (−0.85) |
| Degree_C/Close_C | | −0.00 (−1.01) | −0.00 (−1.00) | 0.00 (1.28) | 0.00 (0.62) |
| Ceoseniority | | −0.05 (−1.09) | −0.03 (−0.57) | −0.07 * (−1.77) | −0.03 (−0.75) |
| Degree_G/Close_G | | 0.00 (0.53) | 0.00 (0.37) | −0.00 (−1.45) | −0.00 (−1.16) |
| Cfoseniority | | −0.01 (−0.28) | −0.00 (−0.03) | −0.02 (−0.54) | −0.01 (−0.21) |
| Degree_F/Close_F | | 0.00 (0.26) | −0.00 (−1.17) | 0.00 *** (3.09) | 0.00 (0.58) |
| N | 51 | 51 | 51 | 51 | 51 |
| pseudo R ² | 0.02 | 0.06 | 0.08 | 0.08 | 0.07 |
| Harrell's C | 0.53 | 0.62 | 0.64 | 0.69 | 0.64 |

Degree# and Closeness# indicates the results of winsorization approach, with t statistics (using robust standard errors) in parentheses. The symbols *, **, and *** denotes $p < 0.1$, $p < 0.05$, and $p < 0.01$ respectively.

Among the control variables, revenue growth rate showed a significant and positive result in Model 3, meaning that the higher the revenue growth rate (*revgrowth*), the easier it was for the company to shorten the crisis duration. That is, the stronger the company's abilities in sales and profit making are, the more sales it makes and the higher is its revenue, in turn improving operating performance, which may serve as a strategy to overcome a financial predicament.

The variable regarding whether a company's chairman worked concurrently as the general manager showed a significant and negative coefficient in Model 3, meaning that a company whose chairman does not concurrently work as the general manager is more able to shorten the crisis duration. The rest of the regression results are described by social network variables as follows:

(1) Degree centrality of general networks:

With respect to the fourth column of Table 4, both *accountsreceivable* and *longtermloan* present significantly positive coefficients, indicating that the higher receivable turnover rate and long-term loan, the faster a company recovers from financial crisis (shortening the duration). The coefficient of *Chairmanseniority* is significantly negative, meaning that a chairman with a longer tenure cannot lead the company to recover more quickly. Among social network variables, the personal bank networks of executive managers, such as chairmen, general managers, and financial executives and the total and average number of bank networks of company members, all had nonsignificant influences on a company's chance to overcome financial crises.

(2) Closeness centrality of general networks:

With closeness variables added, the long-term loan showed a significant and positive coefficient (winsorization approach), which means that the larger the long-term loan increase, the easier it was for a company to shorten the crisis duration. The study infers that an increase in long-term loans reflects an improvement in enterprise creditworthiness and the securing of long-term funding, which has a positive effect on restoring normal operation. Among the social network variables, the closeness centrality of financial executives' personal general networks showed a significant and positive coefficient in Model 4.

This means that the longer the distance between a company's financial executive and other enterprises or their members, the easier it was for a company to shorten the crisis duration. This study infers that when a financial executive as a node is more distant from all the other nodes in the network, the executive is able to not affect other actors and also not be affected by other actors, thus creating favorable influences on restoring a company from financial crises to normal operation.

Table 5 presents the Cox regression analysis results on whether the social networks of listed companies with the banking industry helped them shorten said crisis. Model 3 and Model 4 were used separately to analyze whether the control variables and social network variables (degree centrality of bank network and closeness centrality of bank network) helped companies overcome their financial crises. The regression results are as follows:

(1) Degree centrality of bank networks:

Among the control variables, the long-term loan also showed significant and positive coefficients when degree variables or closeness variables were added (winsorization approach) in Model 4. This means that the larger the long-term loan increases, the easier it was for a company to shorten the crisis duration. The variable CEO duality showed a significant and negative result in Model 3, meaning that a company whose chairman does not concurrently work as the general manager is more able to shorten the crisis duration. This variable becomes insignificant after adding social network variables, suggesting that social network variables may mitigate the effect of CEO duality.

Table 5. Analysis Results of Cox Regression (Bank Networks).

| | Model 3 | | Model 4 | | |
|-----------------------|--------------------|------------------|--------------------|------------------|--------------------|
| | | Degree | Degree# | Closeness | Closeness# |
| SEO | −0.05 (−0.14) | −0.34 (−0.65) | −0.58 (−1.11) | −0.52 (−0.96) | −0.45 (−0.82) |
| nonoperating | −0.00 (−1.42) | 0.00 (0.39) | −0.01 (−1.24) | −0.00 (−0.51) | −0.01 (−1.12) |
| depFixedAsset | −0.01 (−1.12) | −0.01 (−1.03) | −0.00 (−0.51) | −0.01 (−0.97) | −0.00 (−0.37) |
| accountsreceivable | 0.00 * (1.85) | −0.00 (−1.52) | 0.02 ** (2.08) | 0.00 (0.91) | 0.02 *** (2.74) |
| debt_ratio | −0.01 (−0.91) | −0.03 (−1.41) | −0.03 (−1.22) | −0.02 (−0.95) | −0.02 (−0.85) |
| Longtermloan | −0.28 (−1.54) | −0.24 (−1.22) | 4.71 * (1.82) | −0.33 (1.65) | 4.83 * (1.69) |
| Companysize | −0.12 (−0.38) | 0.04 (0.07) | 0.35 (0.67) | −0.77 (−0.82) | 0.52 (0.59) |
| Revgrowth | 0.01 ** (2.10) | 0.00 (0.21) | 0.00 (0.55) | 0.01 (1.23) | 0.01 (1.08) |
| Cashflow | 0.01 (1.03) | 0.00 (0.25) | −0.00 (−0.09) | 0.02 (0.77) | 0.00 (0.09) |
| Compensation | −0.01 (−0.27) | −0.10 (−1.47) | −0.00 (−0.03) | −0.05 (−0.47) | 0.05 (0.49) |
| personnel change | −0.03 (−0.52) | −0.06 (−0.69) | −0.11 (−0.95) | −0.23 (−1.19) | −0.11 (−0.61) |
| Ceo duality | −0.73 * (−1.75) | −0.52 (−0.88) | −0.73 (−1.21) | −0.52 (−0.90) | −0.68 (−1.27) |
| Degree_BM/Close_BM | | 0.00 (0.04) | −0.00 (−0.21) | 0.00 (0.63) | −0.00 (0.21) |
| Degree_BAM/Close_BAM | | −0.00 (−0.00) | 0.00 (0.36) | −0.00 (−0.76) | −0.00 (−0.40) |
| Chairmanseniority | | −0.02 (−0.74) | −0.04 * (−1.68) | −0.01 (−0.31) | −0.04 (−1.30) |
| Degree_BC/Close_BC | | −0.00 (−0.18) | −0.00 (−0.46) | 0.00 (0.60) | −0.00 (−0.08) |
| Ceoseniority | | −0.03 (−0.77) | −0.03 (−0.56) | −0.04 (−0.79) | −0.02 (−0.54) |
| Degree_BG/Close_BG | | −0.00 (−0.45) | −0.00 (−0.14) | −0.00 (−0.50) | 0.00 (0.39) |
| Cfoseniority | | −0.00 (−0.18) | −0.02 (−0.79) | −0.02 (−0.59) | −0.01 (−0.31) |
| Degree_BF/Close_BF | | 0.00 * (1.66) | −0.00 (−0.55) | −0.00 (−0.22) | −0.00 (−0.52) |
| N | 51 | 51 | 51 | 51 | 51 |
| pseudo R ² | 0.02 | 0.07 | 0.07 | 0.05 | 0.07 |
| Harrell's C | 0.53 | 0.64 | 0.64 | 0.60 | 0.62 |

Degree# and Closeness# indicates the results of winsorization approach, with t statistics (using robust standard errors) in parentheses. The symbols *, **, and *** denotes $p < 0.1$, $p < 0.05$, and $p < 0.01$ respectively.

The symbols *, **, and *** denote $p < 0.1$, $p < 0.05$, and $p < 0.01$, respectively. Among the social network variables, the degree centrality of financial executives' personal bank networks showed a significant and positive coefficient in Model 4, meaning that the larger the number of bank networks of a company's executives with other enterprises or their members, the easier it was for a company to shorten the crisis duration. That is, the more connections of a financial executive as a node had with the bank nodes, the higher the degree centrality of the financial executive. In a social network, the actor closest to the center is able to create the most connections with other actors, thus generating favorable influences on a company's chance to weather from financial crises.

(2) Closeness centrality of bank networks:

There is no significant variable in this model specification. But all the directions of coefficients are the same as in Table 4.

In Tables 4 and 5, we also provide some statistics to examine whether all models are good enough. First, all values of AUC (area under the ROC curve) are larger than 0.8, showing that the qualities of model predictions are acceptable. Second, the goodness-of-fit test is Pearson's chi-square test. All models in Tables 4 and 5 are not able to reject the null hypothesis that the model is valid.

In the following, Table 6 summarizes the results regarding overcoming the crisis and shortening the crisis duration for social network variables.

Table 6. Summary Results of Overcoming Crisis and Shortening Crisis Duration for Social Network Variables.

| | Variable | Actual Results of Overcoming the Crisis | Actual Results of Shortening Crisis Duration |
|---------------------------|--|---|--|
| General network variables | Total interpersonal relationships of company members (Degree_M) | Nonsignificant | Nonsignificant |
| | Average interpersonal relationships of company members (Degree_AM) | Nonsignificant | Nonsignificant |
| | Total interpersonal relationships of chairmen (Degree_C) | Nonsignificant | Nonsignificant |
| | Total interpersonal relationships of general managers (Degree_G) | Nonsignificant | Nonsignificant |
| | Total interpersonal relationships of financial executives (Degree_F) | Nonsignificant | Nonsignificant |
| | Sum of shortest distances for company members (Close_M) | Nonsignificant | Nonsignificant |
| | Average shortest distance for company members (Close_AM) | Nonsignificant | Nonsignificant |
| | Sum of shortest distances for chairmen (Close_C) | Nonsignificant | Nonsignificant |
| | Sum of shortest distances for general managers (Close_G) | Negative | Nonsignificant |
| | Sum of shortest distances for financial executives (Close_F) | Nonsignificant | Positive |
| Bank network variables | Total bank relations of company members (Degree_BM) | Positive | Nonsignificant |
| | Average bank relations of company members (Degree_BAM) | Negative | Nonsignificant |
| | Total bank relations of chairmen (Degree_BC) | Nonsignificant | Nonsignificant |
| | Total bank relations of general managers (Degree_BG) | Nonsignificant | Nonsignificant |
| | Total bank relations of financial executives (Degree_BF) | Nonsignificant | Positive |
| | Sum of shortest distances for company members (Close_BM) | Nonsignificant | Nonsignificant |
| | Average shortest distance for company members (Close_BAM) | Nonsignificant | Nonsignificant |
| | Sum of shortest distances for chairmen (Close_BC) | Nonsignificant | Nonsignificant |
| | Sum of shortest distances for general managers (Close_BG) | Nonsignificant | Nonsignificant |
| | Sum of shortest distances for financial executives (Close_BF) | Nonsignificant | Nonsignificant |

5. Conclusions

The empirical results of this study are as follows. First of all, the logit regression model revealed that among the control variables, for companies with characteristics of high cash flow right, high receivable turnover rate, no seasoned equity offering (SEO), small company size, and chairman not working concurrently as the general manager, it was easier to overcome a financial crisis and restore a normal company status. In terms of social network variables, companies with the characteristic of high closeness centrality of the general manager's general networks are more likely to recover from financial distress. In addition, a company with characteristics of high total degree centrality of its members' banking networks, and low average degree centrality of its members' banking networks was more likely to survive a financial crisis and regain its normal business status.

Secondly, our study further demonstrated, using the Cox regression model, that among the control variables, for companies with characteristics of a high revenue growth rate, low receivable turnover rate, low average compensation for board directors and supervisors, chairman not working concurrently as the general manager, and low number of personnel changes among chairmen, general managers, or financial executives, it was easier to shorten the crisis duration.

Among the social network variables, for companies with characteristics of low closeness centrality of the financial executive's personal general networks, and high degree centrality of the financial executive's personal bank networks, it was easier to shorten the crisis duration. Thus, the financial executives should concentrate on building their bank networks, rather than general networks, in order to shorten the crisis. This echoes with our findings that long-term debt increases can help shorten the crisis for companies.

Social networks are valuable intangible assets to a company's operation and help increase the operating performance. Social networks can not only provide the required resources of a company internally but also display the company's external value. However, the measuring standard for a company's social networks is not always associated with the number of connections or closeness of relations. To generate great benefits from a favorable social network, "moderate" investment must be made in the establishment of network relations. Therefore, if a company in financial crisis seeks to use social networks to overcome the crisis or shorten the crisis duration, the principle of "quality over quantity" applies. This confirms the concept, proposed by Pratono [13], that a social network with trust will bring positive impact upon firm performance through enhanced selling and pricing capability. This also supports the assertion that firms which form alliances with broad social capital can create value growth [19].

The chairman, general manager, financial manager and all members of the company should not consider size as the sole factor but consider the structure of the social network carefully. Otherwise, high costs may be induced due to the establishment of wide but shallow social relations. Taking this principle into account, we conclude that the quality of social network relations and trust prevails over the number of relations a company has.

Herein, we also provide several suggestions for further extensions and modifications. First, the 16 types of company-level financial crises are defined by the TEJ database. Further research can separate these types into different categories, such as real financial crisis and prospective financial crisis events, in order to gain more insights into the effects of social networks. Second, researchers can apply alternative proxies to measure financial crises/distress, e.g., distance to default, probability of default, and z-score. Thus, a panel estimation can be used instead of only cross-sectional estimation.

Third, not all our employed control variables and social network variables exerted significant effects on the dependent variables. Accordingly, other related variables may be incorporated as research variables in the future to investigate whether other factors can be helpful for companies to overcome financial crises and shorten crisis duration. Finally, the SNA method represents a novel measuring tool when calculating the degree centrality and closeness centrality of social networks. Researchers in the future may include additional measurement methods suggested by the existing literature to increase the value of the

application, since the present study only looked at two representative indicators (degree centrality and closeness centrality).

Author Contributions: Conceptualization, S.-H.L. and T.-P.C.; methodology, T.-P.C. and Z.-Y.L.; software, Z.-Y.L.; validation, T.-P.C.; formal analysis, T.-P.C. and Z.-Y.L.; investigation, S.-H.L., T.-P.C. and H.-H.L.; resources, T.-P.C. and H.-H.L.; data curation, Z.-Y.L.; writing—original draft preparation, Z.-Y.L.; writing—review and editing, S.-H.L. and H.-H.L.; visualization, T.-P.C. and Z.-Y.L.; supervision, T.-P.C. and H.-H.L.; project administration, T.-P.C. All authors have read and agreed to the published version of the manuscript.

Funding: The authors thank financial support from Taiwan’s Ministry of Science and Technology (MOST109-2410-H-224-015).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: On demand.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. Control Variables and Definitions.

| Control Variable | Definition | Reasons |
|---|---|---|
| SEO | Seasoned equity offering is a dummy variable that equals one if the company launch SEO, and zero otherwise. | SEO is more likely to increase a company’s net worth, which is one of the ways of overcoming the financial crisis. The company can borrow money from investors to raise the required funds to help make up for losses, expand operations, or invest in a new business to get out of financial problems. Thus, SEO can help companies going through financial difficulties and shorten the duration of the crisis. |
| Non-operating | Ratio of non-operating income to total income = $\frac{\text{net non-operating income}}{\text{total income}} \times 100\%$ | This ratio represents the amount of various income and expenses that are not directly related to a company’s production and operation activities in its net revenue. The financial crisis companies themselves are not performing well. They usually overcome their insufficient funds through non-operating income. Therefore, a higher non-operating expenditure ratio will help companies survive the crisis. |
| Growth rate of depreciable fixed assets (depFixedAsset) | Growth rate of depreciable fixed assets = $\frac{(\text{depreciable fixed assets} \div \text{depreciable fixed assets at the same period last year} - 1) \times 100\%}{}$ | The ratio indicates the change in depreciable fixed assets from one period to another. The higher the ratio, the more likely the company will invest in depreciable assets, which will reduce working capital. The lower the growth rate of depreciable fixed assets, the more likely the company will survive financial crises and shorten its duration of crises |
| Account Receivable turnover rate (accountsreceivable) | Receivable turnover rate = $\frac{\text{Net credit sales}}{\text{accounts receivable}}$ | Account Receivables turnover ratio is an accounting measure used to determine how efficiently a company collects accounts receivables. If the ratio is smaller, it means that the company has a high risk of raising bad debts; on the other hand, if the recovery rate is faster, it means that the company has abundant working capital which can be utilized. The higher the turnover rate, the more likely the company can survive in financial crisis. |

Table A1. Cont.

| Control Variable | Definition | Reasons |
|--|---|--|
| Debt ratio (debt_ratio) | Ratio of total debts to total assets = Total debts/total assets \times 100% | Debt ratio measures the percentage of a firm's assets that are financed by debts. On the one hand, a higher debt ratio presents a higher default risk. On the other hand, however, a higher debt ratio implies that the company can raise its funding via external resources more easily. Thus, the higher the debt ratio, the more likely the company can survive in financial crisis. |
| Making or repayment of long-term loans (longtermloan) | An increase (decrease) in the amount of money borrowed from banks or other financial institutions over 1 year in log value | The term "long-term loan" refers to the increase of money borrowed by a company from a bank or other financial institution for a term of more than one year. However, the variable here means an increase or decrease in the amount of the long-term loan. The money must be returned with paying interest, which will increase the operating costs of the company. Reducing long-term borrowing thus helps companies in financial distress and shortens their crisis period. |
| Company size (companysize) | Total assets of the company in log value | The size of the company is often measured by its total assets. When a large company has a financial crisis, it is often difficult to survive due to its large scale and high funding gap. On the other hand, small companies are more likely to survive the crisis due to their small scale and low funding gap. Therefore, tightening the company's scale is one way to cope with the crisis and shorten its crisis period. |
| Revenue growth rate (revgrowth) | Revenue growth rate = (current revenue – revenue of last year) \div (revenue of last year) \times 100% | A stable and positive revenue growth rate means that the company is in a state of stable growth, which leads to an increase in sales. Therefore, an increase in revenue helps companies in financial crisis to survive. |
| Cash flow right (cashflow) | Cash flow right = (right to direct distribution of earnings + Σ product of shareholding percentage between each control chain), excluding the shares held by the foundation of ultimate controllers and shares held by affiliated groups | Cash flow rights represent the financial claims of shareholders against the companies [44]. In essence, it is the right to distribute earnings to the ultimate controller, which means that ordinary shareholders can receive dividends from the company's operating profits. Cash flow rights provide shareholders with a greater understanding of the firm's goals and level of risk tolerance [45]. If cash flow rights are higher, it means that the shareholders have a larger capital contribution to the company. Therefore, the higher the cash flow right is, the more likely the company is to survive and shorten the financial crisis. |
| Compensation | Average annual salary for board directors and supervisors in log value | The compensation of directors and supervisors is an essential factor in corporate governance. If remuneration of directors and supervisors is higher, it means that the company should spend more. By reducing costs and expenses, the company can reduce operating costs, which is a method of saving money to overcome the financial crisis. Therefore, the less the average salary of each director and supervisor is, the less likely the financial crisis will occur. |

Table A1. Cont.

| Control Variable | Definition | Reasons |
|------------------|--|--|
| Personnel change | Number of personnel changes among chairmen, general managers, and financial executives over the last 3 years | The turnover of senior executives often means that the company's operating performance is not good. If the number of changes in the chairman, general manager and financial director is more frequent, it means that the company has a higher chance of major adverse events. Therefore, the fewer changes of the chairman, general manager and financial director, the more likely the company can survive the crisis and the shorter the crisis period. |
| CEO duality | The chairman does not work concurrently as the general manager: 0; the chairman works concurrently as the general manager: 1. This variable is a dummy variable. | The economic system in Taiwan is dominated by small and medium-sized enterprises and family businesses. It is quite common that the chairman also serves as the general manager or CEO, which is often referred to as CEO duality. Yang and Zhao [46] indicate the benefits of CEO duality in saving information costs and making quick decisions. However, with the concentration of power in one person and the lack of supervision mechanism, concurrent positions may lead to company earnings manipulation or increase the possibility of financial crisis. Thus, if the chairman does not have the position of general manager, the more likely the company can survive the crises and shorten the duration of crises. If there is no concurrent appointment, it is 0; if there is concurrent appointment, it is 1. This variable is a dummy variable. |
| Seniority | Seniorities of chairmen, general managers, and financial executives (chairmanseniority, ceoseniority, and cfozeniority) | The seniority of the chairman, general manager and financial director is one of the important bases of company's operational performance. Although seniority represents higher salary costs, the employee seniority often has a positive correlation with company stability and organizational commitment. Thus, the higher the seniority, the more likely the company can survive the crisis and the shorter the crisis period. |

Appendix B

Table A2. Social network variable definitions.

| Variable | Definition | Reason | |
|---------------------------|------------|---|---|
| General network variables | Degree_C | Total interpersonal relationships of chairmen | Degree (degree centrality, general network) means the number of direct connections that the chairman, general manager, or financial director or company members (directors, managers, and other executives) have with other individuals (of firms) in the network. The connections can be made with individuals who share the same educational background, work experience, or training courses, etc. Degree centrality shows how strategically important the directors or executives are within their network [47]. Not only is it influenced by the connections of the directors or executives themselves, but also by those who are connected to their connections. Based on Brass and Burkhardt [48], executives or directors with a high degree of centrality are more likely to have a higher level of visibility within the network, as well-connected executives tend to have stronger relations with other executives. This social capital help companies in financial crisis to survive the crisis and shorten the crisis period. |
| | Degree_G | Total interpersonal relationships of general managers | |
| | Degree_F | Total interpersonal relationships of financial executives | |
| | Degree_M | Total interpersonal relationships of company members | |
| | Degree_AM | Average interpersonal relationships of company members | |

Table A2. Cont.

| | Variable | Definition | Reason |
|------------------------|------------|--|---|
| | Close_C | Sum of shortest distances for chairmen | The Closeness (closeness centrality, general network) is the inverse of the sum of the (shortest) distances between a director or executive and all other individuals in a network. It indicates how efficiently the director or executive can obtain information from other individuals in the network. Closeness centrality is an indirect connection measure to capture information collection ability. A higher close score for the director or executive implies a shorter distance to other connected individuals of other companies, further allowing the director or executive to be able to acquire efficient information or financial resources. |
| | Close_G | Sum of shortest distances for general managers | |
| | Close_F | Sum of shortest distances for financial executives | |
| | Close_M | Sum of shortest distances for company members | |
| | Close_AM | Average shortest distance for company members | |
| Bank network variables | Degree_BC | Total bank relations of chairmen | Degree (degree Centrality, bank network) means the number of direct connections that the chairman, general manager, or financial director or company members have with other individuals (of banks) in the network. The connections could be with those who have the same educational background, working experience, and on-job training, etc. Degree centrality shows how strategically important the directors or executives are within their network [47]. Not only is it influenced by the connections of the directors or executives themselves, but also by those who are connected to their connections. Based on Brass and Burkhardt [48], executives or directors with a high degree of centrality are more likely to have a higher level of visibility within the network, as well-connected executives tend to have stronger relations with other executives. This social capital help companies in financial crisis to survive the crisis and shorten the crisis period. |
| | Degree_BG | Total bank relations of general managers | |
| | Degree_BF | Total bank relations of financial executives | |
| | Degree_BM | Total bank relations of company members | |
| | Degree_BAM | Average bank relations of company members | |
| | Close_BC | Sum of shortest distances for chairmen | |
| | Close_BG | Sum of shortest distances for general managers | |
| | Close_BF | Sum of shortest distances for financial executives | |
| | Close_BM | Sum of shortest distances for company members | |
| | Close_BAM | Average shortest distance for company members | |

References

1. Kilduff, M.; Tsai, W. *Social Networks and Organizations*; Sage: London, UK, 2003.
2. Inkpen, A.C.; Tsang, W.K. Social capital, networks, and knowledge transfer. *Acad. Manag. Rev.* **2005**, *30*, 146–165. [[CrossRef](#)]
3. Adler, P.S.; Kwon, S.W. Social capital: Prospects for a new concept. *Acad. Manag. Rev.* **2002**, *27*, 7–40. [[CrossRef](#)]
4. El-Khatib, R.; Fogel, K.; Jandik, T. CEO network centrality and merger performance. *J. Financ. Econ.* **2015**, *116*, 349–382. [[CrossRef](#)]
5. Godlewski, C.J.; Sanditov, B. Financial institutions network and the certification value of bank loans. *Financ. Manag.* **2018**, *47*, 253–283. [[CrossRef](#)]
6. Lavie, D. Network resources: Toward a new social network perspective. *Acad. Manag. Rev.* **2008**, *33*, 546–550.
7. Yu, S.H.; Chiu, W.T. Social networks and corporate performance: The moderating role of technical uncertainty. *J. Manag. Issues* **2013**, *25*, 26–45.
8. Powell, W.W.; Koput, K.W.; Smith-Doerr, L. Interorganizational collaboration and the locus of innovation: Networks of learning in biotechnology. *Adm. Sci. Q.* **1996**, *41*, 116–145. [[CrossRef](#)]
9. Coleman, J.S. *Foundations of Social Theory*; Harvard University Press: Cambridge, MA, USA, 1994.
10. Uzzi, B. Social structure and competition in interfirm networks: The paradox of embeddedness. *Adm. Sci. Q.* **1997**, *42*, 35–67. [[CrossRef](#)]
11. Maurer, I.; Ebers, M. Dynamics of social capital and their performance implications: Lessons from biotechnology start-ups. *Adm. Sci. Q.* **2006**, *51*, 262–292. [[CrossRef](#)]
12. Higgins, M.C.; Gulati, R. Getting off to a good start: The effects of upper echelon affiliations on underwriter prestige. *Organ. Sci.* **2003**, *14*, 244–263. [[CrossRef](#)]
13. Pratono, A.H. From social network to firm performance: The mediating effect of trust, selling capability and pricing capability. *Manag. Res. Rev.* **2018**, *41*, 680–700. [[CrossRef](#)]
14. Lins, K.V.; Servaes, H.; Tamayo, A. Social capital, trust, and firm performance: The value of corporate social responsibility during the financial crisis. *J. Financ.* **2017**, *72*, 1785–1824. [[CrossRef](#)]
15. Sapienza, P.; Zingales, L. A trust crisis. *Int. Rev. Financ.* **2012**, *12*, 123–131. [[CrossRef](#)]
16. Liu, C.L.; Chiu, J.; Wang, Y.J. Corporate social network and bank loan contract. *J. Financ. Stud.* **2018**, *26*, 27–89.
17. He, Y.; Xu, L.; McIver, R.P. How does political connection affect firm financial distress and resolution in China? *Appl. Econ.* **2019**, *51*, 2770–2792. [[CrossRef](#)]
18. Vasudeva, G.; Zaheer, A.; Hernandez, E. The embeddedness of networks: Institutions, structural holes, and innovativeness in the fuel cell industry. *Organ. Sci.* **2013**, *24*, 645–663. [[CrossRef](#)]
19. Carayannis, E.G.; Grigoroudis, E.; Del Giudice, M.; Della Peruta, M.R.; Sindakis, S. An exploration of contemporary organizational artifacts and routines in a sustainable excellence context. *J. Knowl. Manag.* **2017**, *21*, 35–56. [[CrossRef](#)]
20. Zheng, W.; Singh, K.; Mitchell, W. Buffering and enabling: The impact of interlocking political ties on firm survival and sales growth. *Strateg. Manag. J.* **2015**, *36*, 1615–1636. [[CrossRef](#)]
21. Liu, J.; Wu, C.; Li, Y. Improving financial distress prediction using financial network-based information and GA-based gradient boosting method. *Comput. Econ.* **2019**, *53*, 851–872. [[CrossRef](#)]
22. Andrade, G.; Kaplan, S.N. How costly is financial (not economic) distress? Evidence from highly leveraged transactions that became distressed. *J. Financ.* **1998**, *53*, 1443–1493. [[CrossRef](#)]
23. Foster, B.P.; Ward, T.J. Analysis of the usefulness of debt defaults and going concern opinions in bankruptcy risk assessment. *J. Account. Audit. Financ.* **1998**, *13*, 351–371. [[CrossRef](#)]
24. Kose, J.; Lang, H.P.; Netter, J. The voluntary restructuring of large firms in response to performance decline. *J. Financ.* **1992**, *47*, 891–918.
25. Barnes, J.A. Class and committees in a Norwegian island parish. *Hum. Relat.* **1954**, *7*, 39–58. [[CrossRef](#)]
26. Aldrich, H.; Dubini, P. Personal and extended networks are central to the entrepreneurial process. *J. Bus. Ventur.* **1991**, *6*, 305–313. [[CrossRef](#)]
27. O'Donnell, A.; Gilmore, A.; Cummins, D. The network construct in entrepreneurship research: A review and critique. *Manag. Decis.* **2001**, *39*, 749–760. [[CrossRef](#)]
28. Freeman, L.C. Centrality in social networks conceptual clarification. *Soc. Netw.* **1979**, *1*, 215–239. [[CrossRef](#)]
29. Gulati, R. The Dynamics of Alliance Formation. Ph.D. Dissertation, Harvard University, Cambridge, MA, USA, 1993.
30. Gulati, R. Network location and learning: The influence of network resources and firm capabilities on alliance formation. *Strateg. Manag. J.* **1999**, *20*, 397–420. [[CrossRef](#)]
31. Kogut, B. Joint ventures: Theoretical and empirical perspectives. *Strateg. Manag. J.* **1988**, *9*, 319–332. [[CrossRef](#)]
32. Rowley, T.; Behrens, D.; Krackhardt, D. Redundant governance structures: An analysis of structural and relational embeddedness in the steel and semiconductor industries. *Strateg. Manag. J.* **2000**, *21*, 369–386. [[CrossRef](#)]
33. Soh, P.H. Network patterns and competitive advantage before the emergence of a dominant design. *Strateg. Manag. J.* **2010**, *31*, 438–461. [[CrossRef](#)]
34. Lin, N. *Social Capital: A Theory of Social Structure and Action*; Cambridge University Press: New York, NY, USA, 2001.
35. Rodan, S. Innovation and heterogeneous knowledge in managerial contact networks. *J. Knowl. Manag.* **2002**, *6*, 152–163. [[CrossRef](#)]
36. Rodan, S.; Galunic, C. More than network structure: How knowledge heterogeneity influences managerial performance and innovativeness. *Strateg. Manag. J.* **2004**, *25*, 541–562. [[CrossRef](#)]

37. Young, C.S. Top management team's social capital in Taiwan. *J. Intellect. Cap.* **2005**, *6*, 177–190. [[CrossRef](#)]
38. Chowdhury, S.D.; Lang, J.R. Turnaround in small firms: An assessment of efficiency strategies. *J. Bus. Res.* **1996**, *36*, 169–178. [[CrossRef](#)]
39. Abdullah, T.M.C.; Hussin, Z. Moderating effects of government assistance & turnaround strategies: A research on private manufacturing companies. *J. Glob. Strateg. Manag.* **2010**, *4*, 64–73.
40. Miglani, S.; Ahmed, K.; Henry, D. Corporate governance and turnaround: Evidence from Australia. *Aust. J. Manag.* **2020**, *45*, 549–578. [[CrossRef](#)]
41. Tabachnik, B.G.; Fidell, S.L. *Using Multivariate Statistics*; Pearson Education Inc.: Hoboken, MA, USA, 2007.
42. McGregor, D.E.; Palarea-Albaladejo, J.; Dall, P.M.; Hron, K.; Chastin, S.F.M. Cox regression survival analysis with compositional covariates: Application to modelling mortality risk from 24-h physical activity patterns. *Stat. Methods Med. Res.* **2020**, *29*, 1447–1465. [[CrossRef](#)]
43. Baker, W.E.; Faulkner, R.R. Social networks and loss of capital. *Soc. Netw.* **2004**, *26*, 91–111. [[CrossRef](#)]
44. La Porta, R.; Lopez-de-Silanes, F.; Shleifer, A. Corporate ownership around the world. *J. Financ.* **1990**, *54*, 471–517. [[CrossRef](#)]
45. Wang, I.K.; Bendell, B.L.; Kubo, R.; Leo, E. The interdependency of cash flow rights and voting rights on post-acquisition value. *Asia Pac. Manag. Rev.* **2020**, *25*, 177–187. [[CrossRef](#)]
46. Yang, T.; Zhao, S. CEO duality and firm performance: Evidence from an exogenous shock to the competitive environment. *J. Bank. Financ.* **2014**, *49*, 534–552. [[CrossRef](#)]
47. Wasserman, S.; Faust, K. *Social Network Analysis: Methods and Applications*; Cambridge University Press: Cambridge, UK, 1994.
48. Brass, D.J.; Burkhardt, M.E. Potential power and power use: An investigation of structure and behavior. *Acad. Manag. J.* **1993**, *36*, 441–470.